RIFLES
THAT I HAVE USED
AND DESIGNED

By
RALPH G. PACKARD

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INTRODUCTION

It has been my good fortune to have known a majority of the American small arms designers of the past half century, and to have become intimately acquainted with their products. Among these my friend Mr. Ralph G. Packard stands alone and unique in one respect. His designs have been made with an intimate knowledge of the requirements of the users. He has specialized on sporting rifles and those which he has produced are all of a type suitable for use by sportsmen who hunt their game in the wilderness.

In all other cases that I have known the inventor has produced a mechanism, and based on it the manufacturer has produced a rifle for commercial sale. The first models of such rifles have never satisfied the sportsman. Many modifications have had to be made before the product met the exacting requirements of the experienced hunter. Mr. Packard alone, in his initial effort, has produced a finished article, correct as to all the major and minor details which the hunter regards as essential.

Some of these details which Mr. Packard has incorporated in his design are:

Ruggedness and strength. Weapons suitable to withstand the rough and tumble of hunting and primitive travel in a wilderness, hundreds of miles from a gun-

smith or mechanic.

A design which permits complete disassembly of the entire rifle for cleaning, adjustment, or repair. Mr. Packard's scheme of using the bolt handle as a wrench and screw-driver is unique.

The design of reticule adjustment of the telescope which eliminates all lost motion and back-lash. This has since been imitated by some telescope sight makers with Mr. Packard's kind permission. Any sight which does not have accurate, recordable, and rugged adjustments for elevation and windage falls far short of being satisfactory.

The incorporation of the telescope tube as a part of the receiver forging, thus giving to the telescope that strength and reliability possible to obtain in no other manner. I note with interest that Mr. Packard incorporated this feature in his design only after the telescope itself had been developed to the point where it could be regarded as satisfactory to the exclusion of all other sights.

The relationship of line of aim to the comb of the stock, and of the eye relief to the normal firing position of the eye, have been given proper attention in Mr. Packard's designs. Where this important detail has been accomplished in commercial design it has only been after many years of experience and assistance by using riflemen.

Mr. Packard states that he had no particular trouble in arriving at the proper tolerances and clearances of the various parts; a very remarkable statement in view of the trouble that these details have usually given other designers.

Mr. Packard's varied experiences all over the World, which he has so interestedly intersperced between the descriptions of his several designs, make most fascinating reading. They will come as a surprise to many readers who imagined that they knew of all the more celebrated hunters and explorers of the century.

It has been a rare privilege to have visited Mr. Packard's home, and to have listened to his hunting tales and seen his trophies, pictures, and lantern slides. On one of these occasions Mr. Lokken was present, having come from Yukon Territory on a visit, and

that evening he related one of his experiences which I think should properly be recorded here for the first time.

He was coming down the Big Salmon River in his canoe one fall, and wished to take some fresh meat back to his friends on the Yukon. One day he was in the hills back of the river, and in a small pond about 300 yards downhill he saw a bull moose feeding. Lokken stated that no one but an experienced hunter would have recognized it at first as a moose as only its withers, about the size and appearance of a muskrat, were visible above the surface. (I saw precisely the same thing several years ago in Northwestern Ontario). When the moose raised its head Lokken shouted to cause it to move ashore, and when the moose reached the mossy bank of the pond he shot it (.270 Winchester) and the moose at once fell as though dead. Pretty soon, however, it raised its head and began to crawl on its belly across the swampy shore to a spruce thicket, and just as it reached the thicket Lokken shot again and killed it.

Climbing down from the hillside, he then stood his rifle up against a nearby spruce and proceeded to dress the moose. He was working at the back of the moose, and his rifle was about fifteen feet away on the far side of the carcase. Suddenly he heard a noise, and looking over his right shoulder, he saw a grizzly bear rushing at him, and only about twenty feet away. The grizzly struck him with its paw and claws on his right hip, and the blow hurled Lokken clear across the moose carcase where he landed on his hands and knees. Mr. Lokken says that no man ever scrambled on all-fours so fast as he did for his rifle. He grabbed it and whirled, only to see the grizzly disappearing in the brush. Mr. Lokken bore the scars of the bears claws to his death but was not otherwise seriously injured.

In talking the matter over Mr. Packard, Mr. Lokken and I all agreed that the grizzly had evidently caught the blood scent of the moose without having also gotten the man scent. That when he came to the carcase he saw what he thought was another bear on it, and attacked at once. That as soon as he got the man scent he cleared out. This, I think, is one of the most remarkable experiences in the annals of American big game hunting.

Mr. Packard and Mr. Lokken together have killed far more big game in fair chase and for food than any other American sportsmen, and compared with their extended experiences that of all others pales almost into insignificance. In these proving grounds Mr. Packard has thus been able to form correct opinions as to the value of certain designs, and to incorporate the valuable details into the rifles that he has produced. His opinions and designs as set forth herein are thus the result of wide experience, and I regard all of them as being basically sound.

Townsend Whelen
Colonel, Ordnance Department,
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Washington, D. C.
April 16, 1939

CHAPTER I

EARLY YEARS

My first rifle was a Remington 44-77, using paper patched bullets. This rifle was a single-loader with Remington, rolling block type of breech mechanism, octagon barrel with open-notch sights, and, I think, weighed about ten pounds. I used this rifle for about two years, mostly shooting at a mark. It was altogether too big for small game shooting.

As I had very little money at that time, I used to reload, resize the shells, and make my own bullets. I found after the shells had been resized ten to a dozen times, the shell generally pulled apart at the bottle neck, this piece of the shell going out with the bullet.

I wanted to shoot small game which was quite plentiful at that time about our place at Morristown, New Jersey, so I got a 32-40 Stevens with Lyman sights, which was a very satisfactory gun for me and I used it a great deal. I also reloaded these cartridges and made the bullets.

In 1895, a friend and I took a long trip into Morocco. Before leaving Gibraltar, I bought two Winchester 44-40 Rifles for the trip, but the Moorish custom authorities confiscated them at Tangier. In Tangier I was able to buy a single-loader Mauser Rifle, of about

45 caliber; and a very poor double-barreled Belgian shotgun. We procured an outfit of tents, horses, and men at Tangier and went to Tetuan, Fez, Meknes, Marrakesh, and back to Tangier.

The Mauser Rifle worked all right and I shot a number of wild pigs with it. I tried shooting partridges with the shotgun, but the gun itself was so poor and the cartridges had been reloaded with the weak, native-made powder so I could not make out much with it. This native-made powder is not granulated and you might say is just dust, looking a good deal like cement before it has been wet. I was told one bad feature about this non-granulated powder was that the ingredients would separate from shaking when it was being carried because of the difference in specific gravity of the charcoal, saltpeter and sulphur; consequently, a man might load his gun with practically all charcoal, or perhaps sulphur, or all saltpeter. The Moroccans used this native-made powder exclusively in their muzzle loading flint-lock muskets.

At this time, which was before the French occupation, Morocco was in very disturbed condition, and most of the natives were armed with long-barreled, short-stocked flintlocks. These guns were entirely handmade, and most of them were made in Tetuan or Fez. They carried about a half-inch diameter round lead ball. I went to some of the gun shops to see how they were made and was surprised that they did such good work with the poor, rough equipment that they used. The boring of the barrel was done by hand, and the lock, of course, was mostly file work. They used some imported files but most of them they made themselves. Some of the guns were very beautiful work, with raised engraving on the rear end of the barrels, and the stocks inlaid with silver and gold wire. The butt plate was usually a piece of elephant ivory. These guns, of course, used the native dust powder, and most all of them that I saw had iron ramrods.

My friend, David Gaines, and I happened to be the only white persons in Fez at this time and we saw a sight that probably cannot ever be seen again - that is, black slaves being sold in the open market at public auction.

In 1898 I spent the winter in Egypt with my Father and Mother. This was just after the Dervish War and the Battle of Ormdurman. While in Cairo that winter I was shown a very remarkable photograph. The picture showed a little piece of the new Cairo-Kartoom Railroad, and sitting on the rails was a long line of English soldiers who were filing off the points of their bullets so as to make them mushroom when they came in contact with the Dervishes.

About this time, my Father and I commenced taking almost yearly trips to New Brunswick and Nova Scotia to shoot moose and caribou. I got an 8 mm. Haenel-Mannlicher Rifle, which was a very satisfactory gun and I killed a good deal of game with it, of both moose and caribou. This rifle had open-notched sights, as at that time I could not obtain peep sights for this type of gun.

In 1899 I got an 8 mm. Mauser Rifle which was an excellent gun, and I used this type of rifle for several years. I had a fixed peep sight put on the bridge of the receiver, set it at a hundred and fifty yards without any adjustments, and removed the elevating rear sight on the barrel. In 1905 I went to Newfoundland and shot caribou which, at that time, were plentiful there. I used the 8 mm. Mauser on this trip.

In 1906 I made a horseback trip across the Balkan Peninsula from Salonika to the Adriatic, up into the middle of Albania to Dibra, and back along the coast of the Adriatic into Montenegro, then south again along the coast to nearly opposite Corfu where I obtained a boat to take me over to Corfu and civilization. For this trip I had to have a special Turkish passport which I obtained through Mr. Dickinson, the Consul General at Constantinople, at that time. This special passport gave me an escort of four Turkish soldiers who were changed from time to time in different districts. I was afraid these soldiers might rob me out in the country, so I hired two Albanians as personal bodyguards. These two men were most loyal and faithful. They were armed with a Peabody-Martini Rifle and a revolver. As they knew what they were hired for, they stuck to me almost closer than was comfortable and insisted on being with me all the time.

Mr. Dickinson, the Consul General at Constantinople, lent me his own interpreter for the trip. He was a Mohammedan Albanian. So as not to attract undue attention on this trip, I dressed as an Albanian Tribesman - white skull cap; white wool shirt; white drawers or tights that extended down to my pointed rawhide moccasins. These pants or drawers had a black braid stripe on the outside seam, full length. I carried a rifle, revolver and cartridge belt, and altogether resembled a tribesman of that territory. I carried no baggage with the exception of a blanket, and bought provisions for myself and party at the native villages as I went along, mostly sheep and goats, and slept in the native huts at night. The huts were of stone with no windows, a dirt floor, no chimney but a hole in the roof, the woodfire being made in the center of the floor. All cooking was done in a beehive shaped stone oven, and the flour for the bread was ground in small stone hand-mills, and baked in cakes on the hot stones forming the bottom of the oven. The sheep and goats that I lived on cost sixty cents a piece, and I found that if I would give the skin to the owner of the oven he would cook the sheep or goat for me.

The country at this time belonged to Turkey and was in a very disturbed state due to the invasion of Greek and Bulgarian revolutionary bands. Everybody went armed; men plowing the fields would have their rifles hung on the handle bars of the plow; the shepherds herding their goats carried rifles also. These rifles were all of the single-shot breech-loading black powder type, but the majority were the Peabody-Martini with which the Turkish Army had formerly been armed before being replaced by the German Mauser.

These old single-shot, black powder guns used a great variety of cartridges. Some of the cartridges had the date of manufacture stamped on the base, as far back as 1872. I made it a point of firing some of the oldest cartridges I could find and they all seemed to work perfect. Most of them were center fire, and some rim fire. They all worked, although from thirty to forty years old, proving how stable was the old black-powder cartridge and its priming material.

The Albanian Tribesmen were good shots; took great

pride in their guns, keeping them scrupulously clean, and generally decorating the stocks with silver ornaments.

On the way to Turkey, I stopped off at Vienna and bought a Mannlicher-Schoenheuer 6.5 mm. carbine, the type that is now used so extensively. The gun had just been put on the market there at the time, and I thought it was the neatest and best finished gun I had ever seen. When I got to Constantinople, the police confiscated this rifle.

In Salonika I bought a Peabody-Martini rifle and a 38 Smith and Wesson Revolver. I shot the rifle at a mark in competition with some of the Albanians. There was no game in the country, and the only hunting was shooting each other.

The following Fall, I went to New Brunswick again and hunted moose. The winter following I decided to go to New Guinea. I went from Vancouver to Brisbane, Australia, where I chartered a small schooner. I had a white captain and six niggers for a crew. This boat, like all those engaged in the pearling trade and going to the Solomon Islands and the coast of New Guinea, was armed because the natives of New Guinea had a very bad reputation for attacking vessels landing there; also the pearling schooners were somewhat semi-piratical and did quite a little highjacking and robbing of shell and pearl from each other. My schooner had a dozen old Martini-Henry Rifles with four or five hundred cartridges. These cartridges were the old Boxer type - the cases made of wound strip brass with the head of the cartridge of iron riveted to the strip brass shell by four rivets. The bullet was paper patched, and because of the thinness of the sheet-brass shell, these cartridges were very easily deformed. I think there must have been a very large tolerance in the chamber of the rifle as you could easily put in one of these dented and more or less deformed shells, but after firing, the shell was perfectly smooth and looked almost as good as a solid drawn case.

The schooner also had a three-inch bore brass cannon, mounted on a wheel truck. I bought about a hundred pounds of half-inch lead bullets and a lot of powder. Several times when we were becalmed going up the Aus-

tralian Coast, I practiced with this cannon. I put in about five pounds of bullets, using oakum for wads, and shot at a box drifting on the water about thirty to fifty yards away. I put on recoil tackle, using two sets of two sheave blocks and half-inch rope, rigging it up like the muzzle loading cannon of the olden days. After experimenting with it several times, I found that I could blow a two-foot square target all to pieces at fifty yards.

I carried a twenty-foot whaleboat on deck of the schooner between the masts, which I used to go ashore for wood and water. I also had with me two 8 mm. Mausers, one Mannlicher-Schoenheuer 6.5 mm. carbine, a ten-gauge lever action Winchester Shotgun, and a 38 caliber Colt Automatic. I brought along plenty of ammunition; also a lot of trade goods to give the natives, which consisted of hatchets, knives, machetes, fish hooks, whistles, mouth organs, and two dozen Forehand and Wadsworth 38 caliber revolvers with a box of cartridges for each.

I went up along the east coast of Australia, inside Great Barrier Reef. I would go ashore from time to time to hunt, expecially in the northern part between Cooktown and Cape York. I shot mostly kangaroos, wild pigs, and a few cassowaries, and caught a number of large sea turtles on the islands of Great Barrier Reef.

From Cooktown to Cape York the territory is entirely unhabited by whites, and in this district there remains a great many aboriginal Australian blacks, living practically in their primitive state. While on these hunting trips, I saw a good deal of them. They were the poorest and lowest of any aboriginals I have ever met. They generally went naked and their only weapons were the throwing spear with which they used a throwing stick, and clubs. I went to several of their corroborees and also went hunting with them a number of times.

From Cape York I went to Thursday Island, the headquarters of the pearling trade of Northern Australia. From Thursday Island to a penal colony called Maruka, belonging to Holland, which is about in the middle of the South Coast of New Guinea, from where I wished to start on a trip into the bush of New Guinea to see the

natives in their primitive state, and also to hunt. Here the Dutch had three to four hundred Malay and Javanese convicts, about a hundred Malay soldiers, and three white officers. I was able to borrow four Malay soldiers from the Governor, sixteen convict laborers, and one interpreter. These Malay soldiers wore a uniform of blue overalls, and a palm fibre hat cocked on the side like the Australians. They went barefoot but carried rawhide sandals to wear when on rough ground. They were armed with the Holland 8 mm. Mannlicher, and also carried a heavy curved cavalry saber in a steel sheath that hung to a shoulder belt. This saber was ground sharp and made a first class machete for cutting away in the bush. I found that several of the convicts with me were ex-soldiers in the Holland Colonial service and knew about firearms, so I armed three of them, one with my spare 8 mm. Mauser; one with the Mannlicher-Schoenheuer; and the third with the ten-gauge Winchester Shotgun. Taking all in all, I had a substantially strong party.

Knowing that I was going to make a long trip and had to go light with but a few carriers, I could take only a limited amount of food. I took no canned goods because of the weight, but took all that could be carried of rice, tea, and sugar. This trip in the bush lasted nearly four months, and most of this time we lived on the country. After one month I was entirely out of salt, soap and sugar. My socks wore out, but my feet got so hard I did not need any. My shoes wore through and I resoled them twice with kangaroo hide, using brass belt wire lacing to sew the hide on. Of course, we got some vegetable food in the way of wild sago, plantains, and bamboo shoots. I supplied the meat by shooting mostly wild pigs, kangaroos, and birds. I also shot a number of cassowaries and some crocodiles. There were great quantities of wild geese, very tame and easy to get. I did a great deal of shooting on this trip and enjoyed it thoroughly, but it was a very hard journey. I realized later that hunting in Central Africa was absolute luxury to what I went through in New Guinea.

Most of the natives were existing in the stone age era, having no metal, using stone axes, bows and arrows,

and throwing spears with a throwing stick. Their canoes were dugouts made from large logs of a type of mahogany. They were worked out mostly by burning with hot balls of clay and cutting the charred wood away with stone or shell adzes. They were superb bowmen and their method and equipment for archery seemed to be almost on a par with the old English long bow practice.

Their bows were made from a stave, split out of a large bamboo. The bow was about three inches wide in the middle, about six and a half feet long, and three-quarters of an inch thick, tapering at each end. The bow was bent so that the rind of the bamboo was on the inside. The string was a narrow ribbon of bamboo rind, five-sixteenths to three-eights of an inch wide, and a little over one-sixteenth of an inch thick. The loops at the end of the string for its attachment to the bow were all made and tied when the bamboo was green and flexible. Afterwards the string was seasoned and dried.

The archers wore a thick braided cuff, or brace, on the left arm, extending from the wrist to the elbow which took the snap of the bow string and prevented it from cutting their arm. They pulled the arrow by the four fingers of the right hand, the arrow being placed between the second and third fingers. The arrows were a bamboo reed with about a third of the length at the front end made of black palm or some other heavy hard wood, and the points, as a rule, were kangaroo toenails or the toenails of some of the large birds.

Their throwing lances were about twelve to fourteen feet long. The rear end was bamboo reed for a length of about eight feet, and the front end from four to six feet of hard heavy wood with a cassowary toenail for a point. These throwing lances were hurled by the aid of a throwing stick which was about three feet long. On the rear end of this stick was lashed a curved-up piece of stone with a sharp end which entered a depression in the rear end of the lance. On the forward end of the throwing stick was usually a crocodile vertebra into which the lance rested. This vertebra also formed a guard for the hand. The natives were fairly accurate with these lances up to about thirty yards.

These natives made fire the same way as the Australian aborigines; that is, by twirling a vertical

stick between the palms of the hands with the lower end of the stick resting on a short stick laid on the ground and held between their feet. They were very expert at this and I have seen them get up a little blaze in two minutes work.

The New Guinea natives that I was in contact with were all head hunters, and I saw a great many smoked heads. They would skin off the scalp and the face all in one piece, cut off the surplus flesh around the face, take out the brain and the eyes, filling the entire skull with some kind of gum, and the skin was then replaced and sewed up. The head was then hung up in a little bark smokehouse and smoked like a ham. This treatment was not a permanent preservation, and, from what I could learn, lasted only five or six years.

After returning to Maruka, I sailed in my boat to Thursday Island where I was able to book passage on a steamer.

For several Falls in succession after my return from New Guinea, I again went hunting in New Brunswick. By this time I had begun to think that the 8 mm. Mauser with peep sights, was the best I could do in the rifle. On one of these trips I took with me a 401 Winchester Automatic. I found it entirely unsatisfactory and would never want to use it as a hunting rifle. I also bought and experimented with the 6 mm. Lee Straightpull, made by the Winchester Company; the 405 Winchester, model 1895; and the Remington-Lee using the 30-40 government cartridge. Of these three rifles I liked the Remington-Lee best, but preferred the 8 mm. Mauser with peep sights to all others.

In 1913, I went hunting in Wyoming, somewhere near the southerly line of Yellowstone National Park. I got elk, sheep, and mule deer. I used the 8 mm. Mauser, and also took with me and used a little, a 280 Ross Rifle. As I recall, this rifle had just come out. I had a fixed peep sight put on the bridge of the receiver and cut off the fixed leaf of the open sight on the barrel. I did not like this rifle nearly as well as the 8 mm. Mauser.

On this hunt in Wyoming I had a guide who had a Blake Rifle, which I thought was an excellent gun. The magazine was of the rotary type, holding seven car-

tridges. These cartridges were held by clips on a spool, which had a ratchet on the rear end, like a revolver. The spool was placed in the magazine cavity in the receiver and revolved by the bolt in the action of loading and ejecting. There was a cocking piece peep sight of a very good design. Why this rifle never became more popular, I do not know, except that it came out much ahead of its time. To my mind it had a great many superior features. I understand the Blake Rifle came on the market about 1898 or 1899.

CHAPTER II

THUMB TRIGGER RIFLES

While hunting in Wyoming I conceived the idea of the thumb trigger for a bolt-action rifle, and I had an 8 mm. Mauser altered to a thumb trigger, the alteration work being done at our own shop in Bayonne, New Jersey.

In this first rifle, I used an 8 mm. Mauser and had a piece welded on to the rear end of the receiver. This extension of the receiver carried the thumb trigger, which was a button with a stem that had a slotted hole through the lower part. Through this hole a lever connected with a small cam in the sear. By depressing the button with the end of the thumb, the sear was depressed and permitted the release of the cocking piece and the firing pin. This extension to the receiver had guides in which slid a hood which formed the trigger guard for the thumb trigger. On the top of this hood was the peep sight, slightly adjustable for deflection. This adjustment was only for zeroing, but not for range. The design gave me an absolutely guided cocking piece. The hood, or trigger guard, together with the cocking piece, was in one piece. I found that welding the extension on the rear end of the receiver was not a good thing, as it softened the receiver and took out its heat treatment.

I made another design in which this extension was milled out in a crotched shape form to go around the rear end of the receiver and was fastened by a through bolt which also formed the pivot for the sear. The rear end of this piece was held by a screwed in pillar through which, in the slotted hole, the thumb trigger lever operated. The lower end of this slotted pillar butted up against the rear end of the extension on the magazine, and was fastened to it by a screw through this extension. I patented this thumb trigger October 24, 1916, Patent No. 1,202,416, and the accompanying patent drawings show it assembled and in detail.

Following this I also made a thumb trigger for a Springfield rifle, shown in the accompanying photographs, in which I made a more or less flexible joint between the cocking piece and the thumb-trigger guard carrying the sight. This was in case the guides of the thumb-trigger guard carrying the peep sight should not always be exactly in line and so jam or retard the forward movement of the firing pin. I had a number of these thumb-trigger rifles made up, several Springfield, and two Wesley-Richards, one a 318 and the other a 425.

About this time I commenced to go hunting in Yukon Territory. On the first trip I took with me the Springfield thumb-trigger rifle shown in the photograph. This rifle had for the rear sight a strip of copper about one thirty-second of an inch thick that was in a horizontal slot in the thumb-trigger guard, and zeroed for deflection by driving sideways. For range, the front sight, which was a three thirty-second ivory bead, was given its right heighth by trial shooting and filing down. This is the rifle shown in the photographs. The sights on the 425 Wesley-Richards were similar, and sights for both rifles were set for one hundred and fifty yards. The Springfield was an excellent gun and I killed a lot of game with it - moose, caribou, sheep, and bear. I also took this rifle to Central America, south of Panama on the Pacific side and shot crocodiles and small game with it. I shot a couple moose with the 425 Wesley-Richards. It was a good gun and a very accurate cartridge, but it was too much gun and too clumsy and heavy to lug around. I made up a machine rest and shot one of the thumb-trigger Springfield; the 425

WHOLE GUN MECHANISM

R. G. PACKARD, Jr.

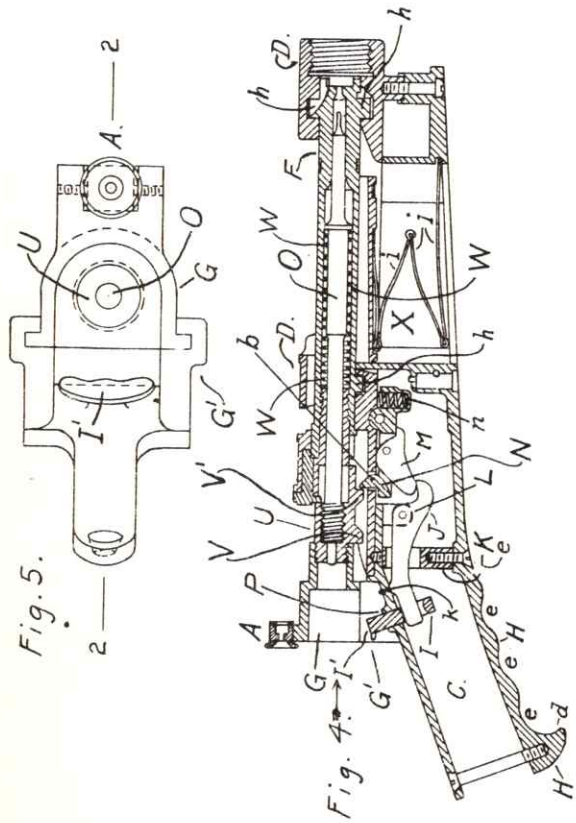
BREECH LOADING FIREARM.

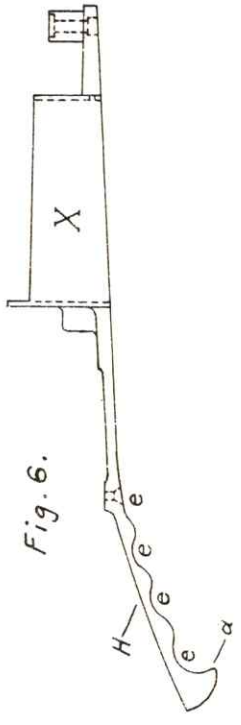
APPLICATION FILED MAR. 21, 1916.

1,202,416.

Patented Oct. 24, 1916.

4 SHEETS—SHEET 3.





Witnesses:
Edwin F. Linder.
Chas. P. Blecker

Ralph G. Packard, Jr. Inventor,
By his Attorney
A. B. Bowers.

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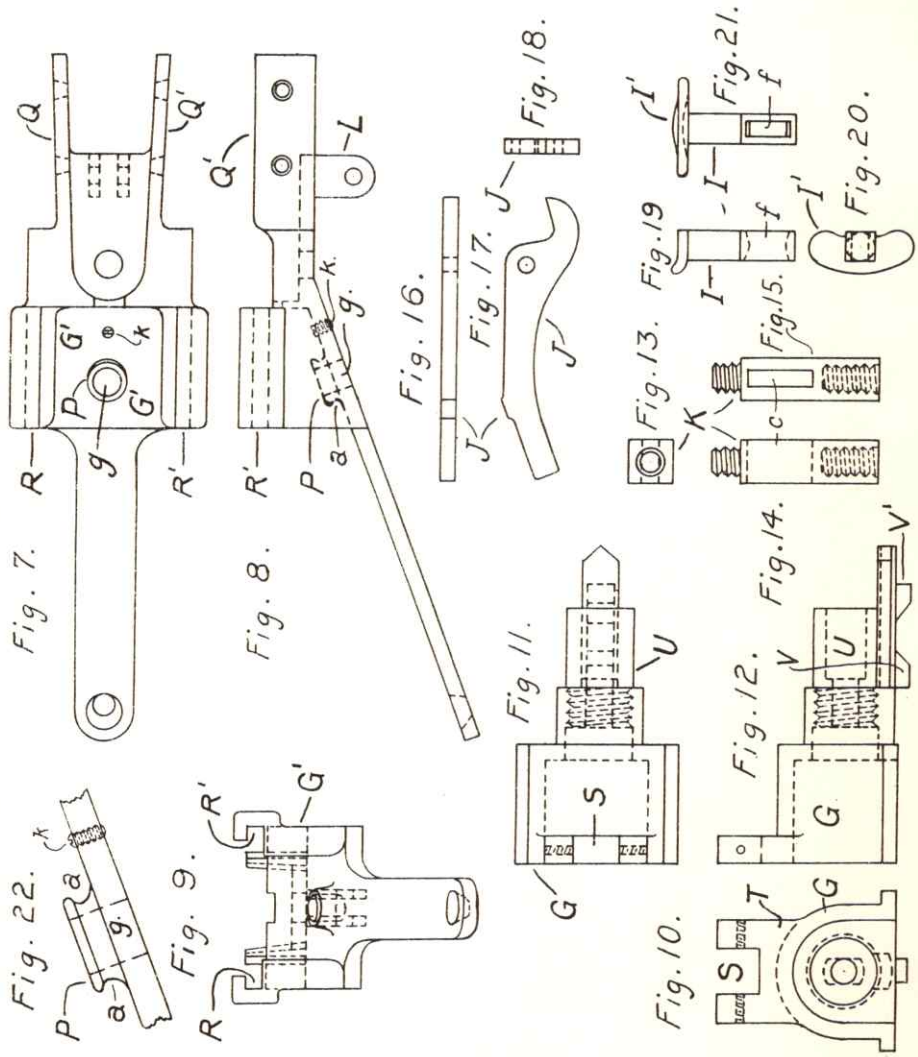
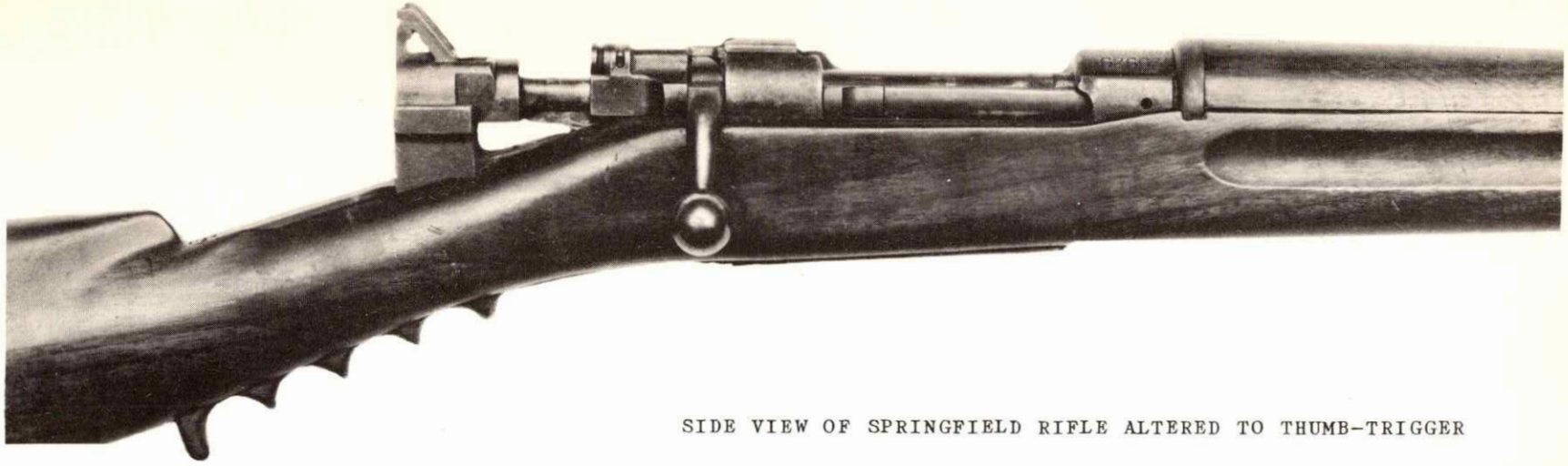
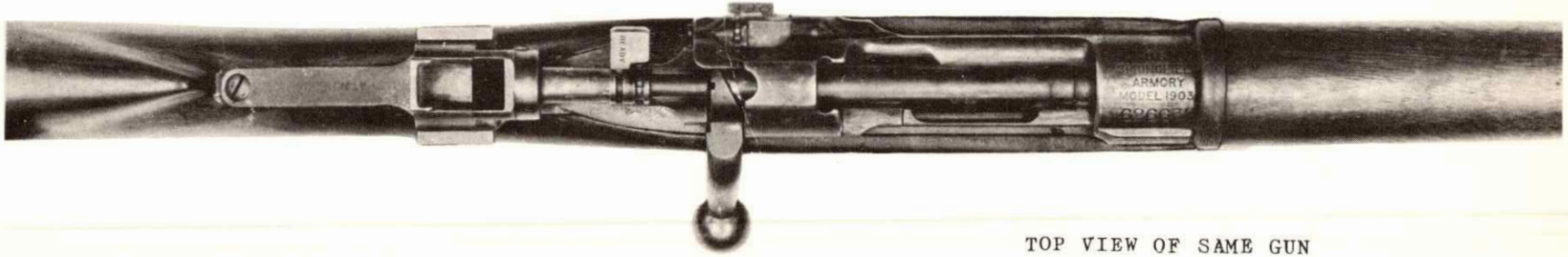


Witnesses:
Edwin F. Linder.
Chas. P. Bleecker

Ralph G. Packard Jr. Inventor
By his Attorney
A. B. Powers.



SIDE VIEW OF SPRINGFIELD RIFLE ALTERED TO THUMB-TRIGGER



TOP VIEW OF SAME GUN

Wesley-Richards; and the 318 Wesley-Richards at two hundred yards. The 425 Wesley-Richards and the Springfield were about alike in accuracy, but the 318 was very bad indeed, so much so, I never wanted to have anything more to do with it. Whether its inaccuracy was due to ammunition or the rifle itself, I do not know.

On these three thumb-trigger rifles I got up a design for sight protection, the idea of which I have followed on all the succeeding guns I have made. This design was two wings about five-eights of an inch apart on the inside on each side of the front sight and standing above it. This is similar to the model 1917 Enfield Rifle used by our Army in the last World War. On this design of thumb-trigger rifles I did not need any protection for the rear sight as it was all enclosed in the thumb-trigger guard.

About 1921 I decided to make an entirely new rifle, including the action; that is, to make it all new from muzzle to butt plate. This rifle was to be a thumb-trigger gun of the general Mauser type with a different design of bolt, cocking piece, safety, sights, and take-down. The receiver is extended sufficiently to the rear of the bolt handle to allow the cocking piece with its attached peep sight to be guided in the same grooves in which the locking lugs of the bolt slide when the bolt is retracted.

On the rear end of the receiver are two open-sided guards with rounded top corners, between which is the peep sight. These vertically projecting lugs on the receiver absolutely protect the peep sight from injury or from catching on anything. The bolt handle is kinked in such a manner that it will pass over the sight protecting lug on the right side of the receiver when the bolt is drawn back.

The thumb-trigger button is between the side walls of the receiver at its rear end, and is directly underneath the cocking piece, the bottom of the thumb-trigger recess being on the same line as the top of the butt stock where it joins the receiver. With the thumb trigger, the rifle is discharged by a vertical downward pressure on the trigger button by the end of the thumb without relaxing the grasp on the stock, the motion being a little over one-sixteenth of an inch.

The safety is operated by a lever which is located in the thumb-trigger recess adjacent to the thumb trigger and on the left side, but is so placed that there is no possibility of the gun being accidentally discharged when the lever is depressed to take off the safety. The controlling theory in designing this safety was that a sportsman has any amount of time to put a safety on but very little time to take it off. This safety is taken off by pressing down the lever with the thumb without moving the hand from its firing position on the small of the stock. This can be done while the gun is being brought into the line of sight, or when it is at the shoulder. The safety is put on by raising the lever until its outwardly turned thumb piece is against the rear left wall of the thumb-trigger pocket and is held firmly but non-positively in the position of on and off. This safety fulfills the three necessary functions of its design: that is, it blocks the firing pin from advancing; it locks the action; and it withdraws the cocking piece from contact with the sear.

The firing pin is detachably held in the bolt with the firing pin spring, under compression, by means of a sleeve formed with a radial lug, which lug is held in a pocket in the underside of the base of the bolt handle by the compression of the firing pin spring. This construction allows me to do away with the rear screwed-in bolt head, as bolt guns are usually made; shorten the bolt without shortening the firing pin spring cavity; and also permits the use of two cocking cams symmetrically located on diametrically opposite sides of the cocking piece, instead of one, as on all other bolt rifles. Hence, when the bolt is rotated and the cocking piece is thrust rearward by the cocking cams, the pressures are circumferentially balanced, and the force applied to compress the firing pin spring tends to shove the cocking piece directly backward without any tendency to cant or jam in the grooves it slides in.

The travel of the firing pin is one-half of an inch and in cocking, this movement of one-half inch is obtained by the cocking piece camming on the bolt in opening five-sixteenths of an inch, and the bolt camming on the receiver in closing three-sixteenths of an inch.

The rear peep sight mounted on the cocking piece is adjustable vertically and horizontally for zeroing and has two sizes of apertures, one being three-thirty-seconds of an inch, and the other nine-thirty-seconds of an inch in diameter, either of which can be rotated into the line of sight as the light conditions require. The front sights are placed between open sided guards somewhat similar to the sight protection that is used on the 1917 Enfield Rifle. There is a small fixed ivory bead for use with the small aperture of the peep sight, and a large bead which folds down into a pocket in front of the fixed small bead. The large bead front sight can be rocked up in front of the fixed bead, entirely obscuring it, and is intended for use with the large aperture of the peep sight at close range in a dim light. I endeavored to make the large bead front sight luminous with radium paste, like the figures on luminous watches. Although the radium paste was protected from wear and moisture by transparent celluloid, this luminous feature did not work out satisfactorily in actual use.

In designing the take-down feature of the rifle, I wished to avoid taking it apart between the sights, and also did not want to disturb the rigid attachment of the barrel to the receiver. This was accomplished by taking off the butt stock where it joins the receiver. A recess is formed in the rear end of the receiver below the thumb-trigger pocket, and into this recess fits a forward projecting plate, or ferrule, attached to the front end of the butt stock which recess, being non-circular, prevents the stock from turning. The stock is fastened to the receiver by a tension rod passing through the stock lengthwise and has a T-head at the forward end, set up by a nut in a pocket in the butt plate. To attach the stock, the T-head of the tension rod is inserted in a slot in the stock-end recess of the receiver and the stock turned one-quarter of a turn which engages the lugs in the receiver with the T-head of the rod. The nut in butt plate is then set up using the bolt as a spanner, the knob on the end of the bolt handle and the nut on the tension rod being especially formed for this purpose. The stock rod nut in the butt plate is locked from unscrewing by a springcatch which

can be shoved out or in lock by using the point of a bullet, of a loaded cartridge, or any other pointed instrument.

The magazine cover plate is hinged at its forward end and has a spring actuated catch at the rear end which can be shoved out of lock when it is desired to open the magazine.

The forward sling-strap stirrup is pivoted on a band going around both the barrel and the forearm and the rear sling-strap stirrup attached to a lug at the lower edge of the butt-plate and forming part of it. There is a trap in the butt-plate and pocket in the stock for a cleaning outfit.

The mechanism of the rifle can be dismounted and assembled without a screw driver or other tools. The work can be done by the fingers, or with the aid of any pointed instrument such as the bullet of a loaded cartridge, a wire nail, or a pointed piece of hard wood. This includes taking the firing pin and its spring out of the bolt, the firing pin out of the cocking piece, the sight out of the cocking piece, the entire safety mechanism, the extractor off the bolt, and the magazine follower and its spring out of the magazine.

The only standard parts used, were a Springfield magazine follower with its spring, a model 1917 Enfield extractor and its band, and a Mauser bolt stop. All other parts of the rifle were of my designing and made especially for this gun, which takes the 30-06 Springfield cartridge. I patented most of the details of this gun on June 1, 1922, U. S. Patent No. 1,582,533. I show two patent drawings; also several photographs. I took this gun to the Yukon Territory and shot moose, caribou, sheep and bear. I also used it on one trip in Central America.

I made four hunting trips to Yukon Territory. On these trips I went in sometime during the month of June, spending the summer and early fall, and coming out during the first two weeks of October; that is, I tried to catch the last steamer up the river before it froze up.

On my first trip to the Yukon I became acquainted with Harold Lokken, who had come into the Yukon Territory on the great gold rush of 1898, and had not been out of the country from the time he went there until I

April 27, 1926. 1,582,533

R. G. PACKARD, JR

BOLT GUN

Filed June 1, 1922 6 Sheets-Sheet 3

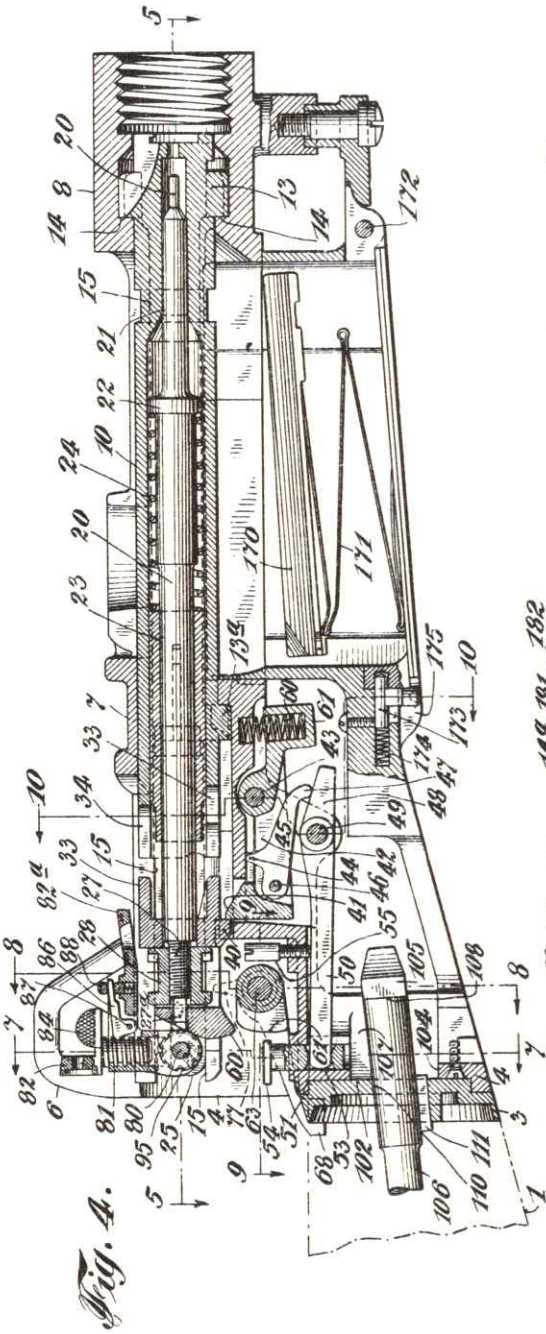


Fig. 4.

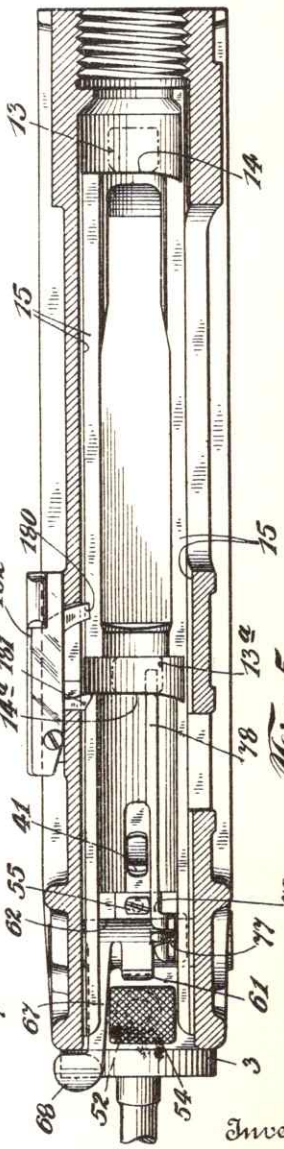


Fig. 5.

Inventor
Ralph G. Packard Jr
By George C. Rhoen
his Attorney

April 27, 1926. 1,582,533

R. G. PACKARD, JR

BOLT GUN

Filed June 1, 1922 6 Sheets-Sheet 1

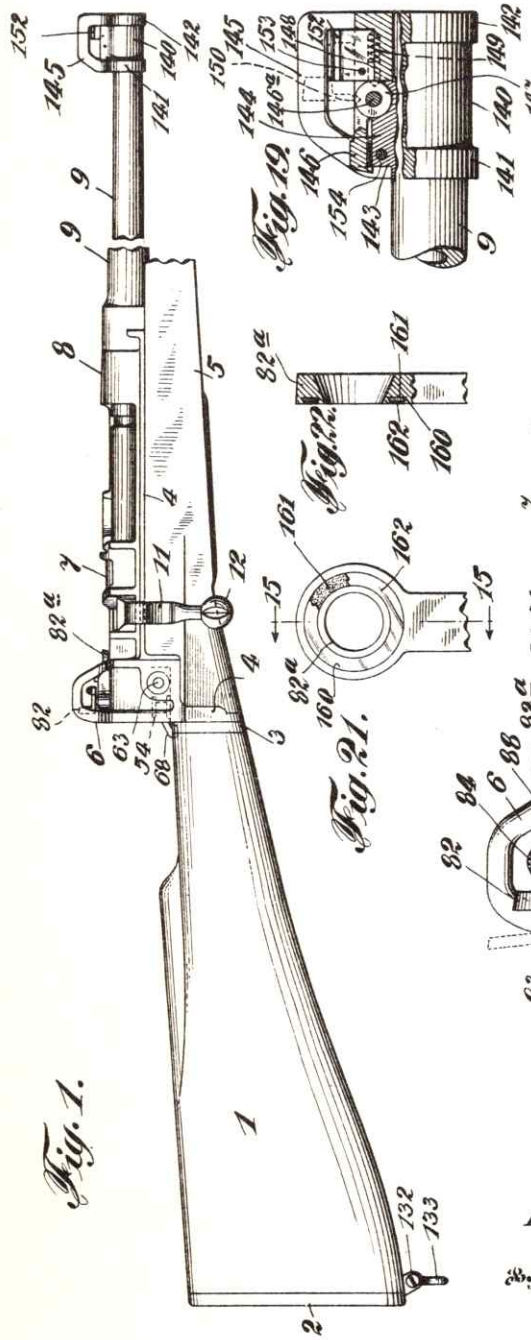


Fig. 1.

Fig. 19.

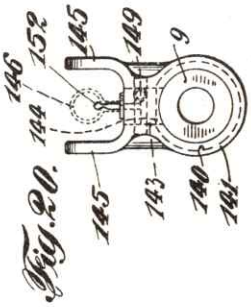


Fig. 20.

Fig. 22.

Fig. 21.

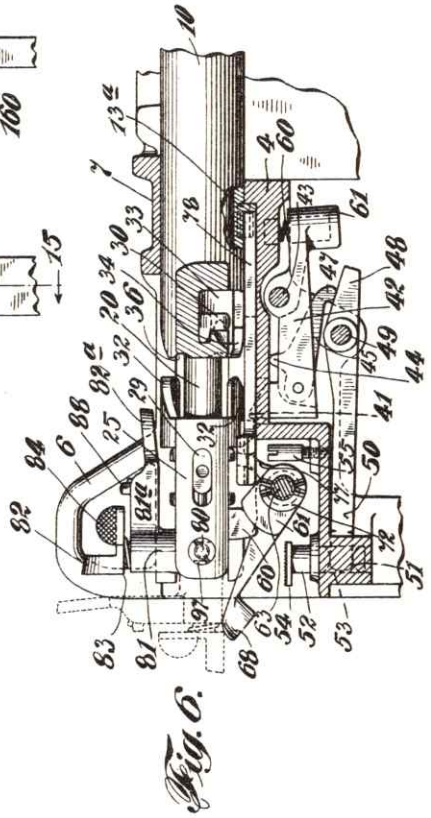
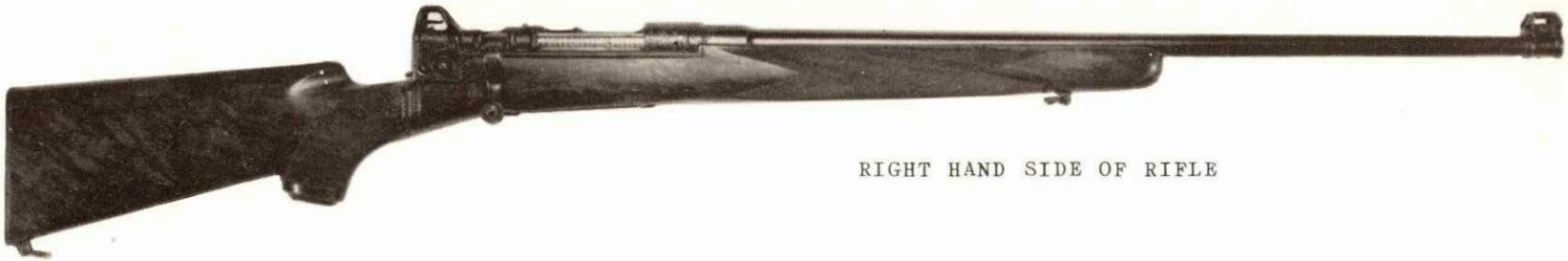
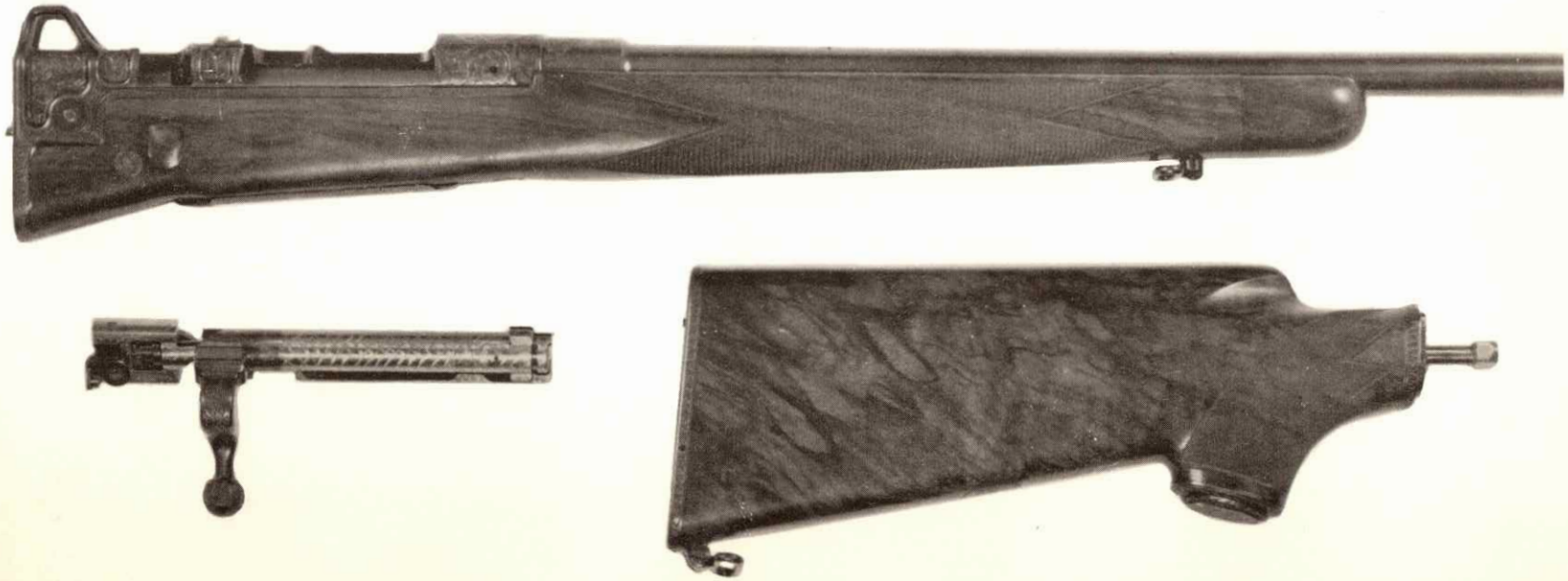


Fig. 6.

Inventor
Ralph G. Packard Jr
By George C. Sheau
his Attorney



RIGHT HAND SIDE OF RIFLE



RIGHT SIDE OF RIFLE SHOWING BOLT AND TAKEDOWN

TOP VIEW OF RIFLE

met him in 1920. Lokken had been a professional meat hunter, government telegraph repair superintendent; he was a great rifle shot, and most interested in the rifle. He had also educated himself by reading and was a most intelligent man. Lokken was with me on all four hunting trips in the Yukon Territory.

As I was interested in experimenting on different details of rifle and telescope sight construction, I sent him a number of guns to try out under actual hunting conditions, and requested that he give me a report on how these details worked out.

CHAPTER III

TELESCOPE SIGHTS

At this time I became interested in the telescope sight. The first one I got up had the Noske mount with a Hensoldt telescope, and was used on a Springfield Rifle but the apparatus was not satisfactory. The second rifle I sent to Lokken was a Springfield with Griffin and Howe single clamp mount. This had the same faults as the Noske. Neither of these mounts retained their accuracy after a few months use.

On the third rifle that I gave to Lokken, I had a special mount made up by Griffin and Howe of their double-lever clamp type, but I had the dovetail increased to about double its width and the length of the dovetail increased to nearly more than half the length of the usual mount. In this mount the parts of contact in the dovetail were hardened and very finely fitted. Lokken told me he used this mount for about two years and it retained its accuracy.

Several years after this I got up a rifle for Lokken. It was a Mauser action for the 30-06 cartridge with twenty-inch barrel, and a special bolt sleeve of my own design which included a side lever safety. The telescope sight was mounted on top and as low down as possible. The rifle had no open sights. The object of

this rifle was to prove that the telescope sight was sufficient for all kinds of hunting in all kinds of weather without any open sights. I will describe this rifle further on in detail.

Lokken and I got up a rather new scheme in hunting. We would have our canoes, provisions and outfit, pushed by a motor boat up one of the branches of the Yukon some time in June. When we got up as far as we could go, we would make a main camp and send the motor boat back. Then we would drift down the river during the summer, making main camps as we went along. Our party, Lokken and I, one other white man and one Indian, would make a long circle into the hills, taking with us four dogs fitted with small canvas packsaddles. This would last about two weeks. I used a very light open-face lean-to, - each man carried his sleeping bag, and the dogs carried a light set of aluminum dishes and what grub and other supplies were necessary. We had good dogs and they carried about thirty-five pounds apiece comfortably.

We made a practice of shooting a moose or caribou to feed the dogs every third day. We let them fill up then and did not feed them in between times. Game was so plentiful we scarcely ever missed this schedule.

After we had made one of these hunting trips, we would shift the main camp farther down the river and make another trip with the dogs, thus working down the river branch until fall to the main river where we would catch one of the last boats to Whitehorse before the freeze up in the early part of October.

Lokken and I enjoyed this system of hunting on the Big Salmon River, the Pelly River, and Macmillan River. Most of this hunting was done above the timber line, using binoculars all the time and hunting as we marched.

In 1923 I designed a new thumb-trigger rifle with a detachable telescope sight. This rifle was very similar to the thumb-trigger rifle previously described, but had some improved details. The length of the bolt and receiver was much shorter; the rifle was entirely hand dismountable, even including the trigger, sear, and sear spring.

The telescope is offset to the left and above the center of the bore to bring it opposite the left eye

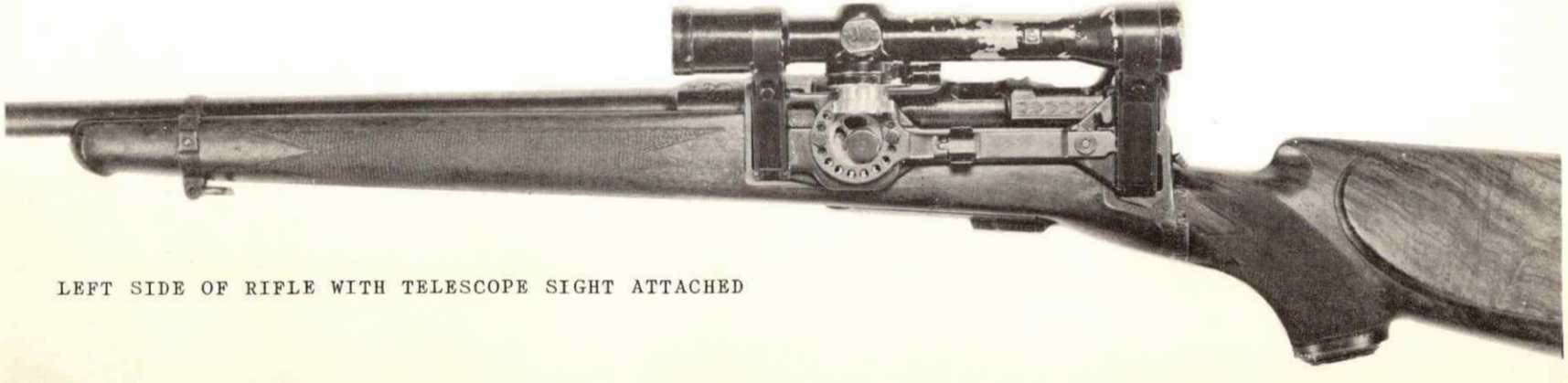
when the head is hard down on the stock. That is, the telescope and the open peep sights are very nearly in binocular relation when the face is in proper contact with the stock. I determined this position of the telescope for use with the left eye by trial, using a telescope adjustably clamped to one of my hunting rifles. I found that the position is about two and one-eights to the left, and about one and one-quarter inches above the center of the bore. By actual use I can find little, if any, disadvantages, in using the telescope with the left eye and it certainly has many advantages over the right eye position, among which are that the head is supported and steadied by the stock in the best possible manner; the bolt can be operated; the magazine charged by a clip; and the telescope and open sights can be used at will without the removal of either. Another advantage of the left eye position which I discovered by use in hunting, was that I could line up the rifle on the animal with the open sights which simultaneously brought the target into the field of the telescope, without moving the head.

The telescope sight is attached to the receiver by two sets of dovetail hooks at the ends of the mounting. Special attention was given in designing the receiver to get the pockets for the dovetails of the mounting far apart so the size of base of attachment to the receiver would be as great as possible. This base of attachment is about seven and one-half inches long and nearly two inches wide.

I used this rifle a great deal and have shot much game with it - moose, caribou, bear, mountain sheep in the Yukon Territory; various kinds of antelope; several water buffalo, and hippopotami in Central Africa. I still think this is one of the best hunting rifles I have ever used.

This rifle is the last thumb-trigger rifle I had made. I was very enthusiastic about this design at first, but after a good deal of shooting with the thumb-trigger, I came to be doubtful of whether it was superior to the finger operated trigger. For snap shooting of running game I am very sure it is better than the finger trigger, but for steady holding on a careful shot when you have time, the thumb, being more or less loose

RIGHT SIDE OF RIFLE WITHOUT TELESCOPE SIGHT



LEFT SIDE OF RIFLE WITH TELESCOPE SIGHT ATTACHED

RIFLE SHOWING TAKEDOWN SYSTEM; BOLT; COCKING PIECE
AND PEEP SIGHT; TELESCOPE SIGHT IN CARRYING CASE

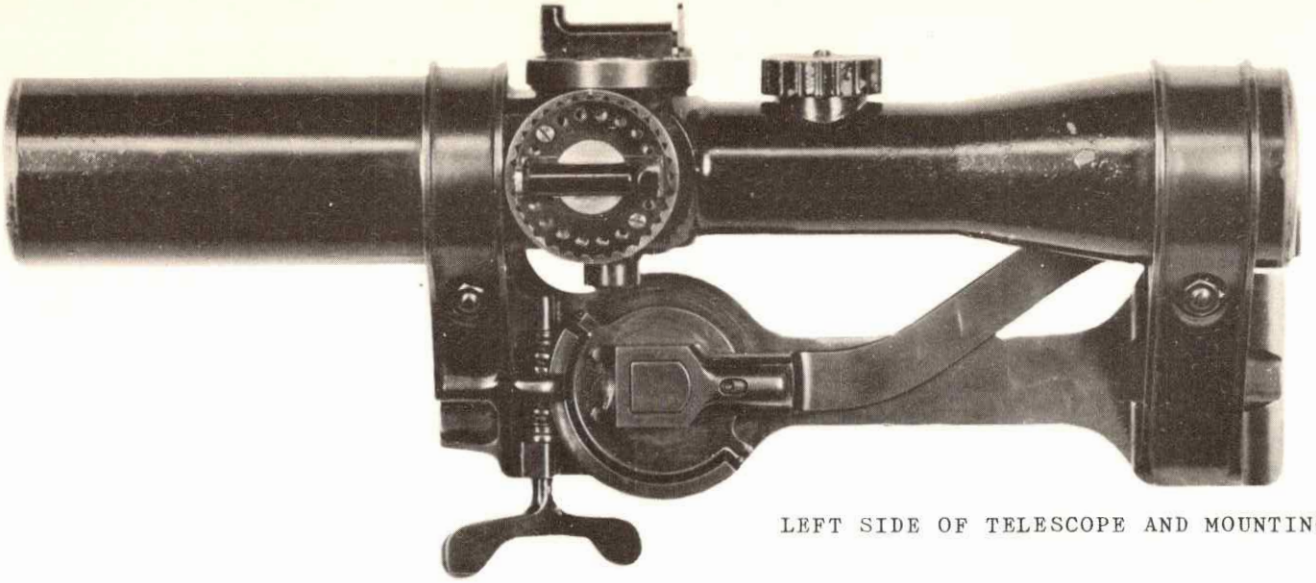
on account of having to operate the thumb-trigger, does not give you as good a grasp on the small of the stock as when you are using the finger trigger.

I am the inventor and patentee of the internal adjustment for telescope rifle sights. The first telescope I designed was used on the rifle just described. As stated in the description of the rifle, there were pockets for dovetail lugs attached to the mounting, milled in the receiver, two at each end; also a place for rotating cam. The cam rotating in this pocket in the receiver feeds the dovetails into mesh, and as the stem of the cam passes through a segment of a worm gear eccentrically by rotating the worm, the cam is advanced and brought into contact with the rear wall of its recess in the receiver. There is a small segment cut off the cam where it bears against the receiver in the locked position which gives ample surface to prevent upsetting and wear.

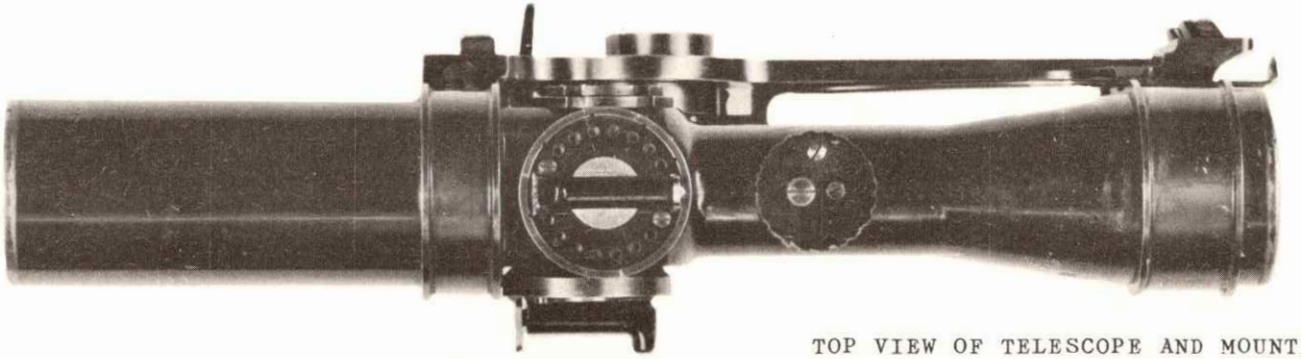
The adjustments for range and deflection are made by moving the reticule vertically and horizontally within the telescope tube. This is done by a vertical sliding carriage in which moves horizontally the reticule that is positively forced in one direction by the adjustment screws and spring pressed in the other; the coil spring for the vertical movement is carried in the telescope tube, and the spring for the horizontal movement is in the vertical sliding carriage and moves with it. By this design I avoided the friction induced by the pressure of one spring working at right angles to the other spring, tending to retard the movement of the reticule.

The sight can be zeroed by removing the two small screws that hold the spring catch to the head of the reticule adjustment screw and turning the catch to engage the zero graduation notch, the clamping screws are then replaced in two sets of holes which will be found always to match diametrically opposite, and these holes are so spaced in vernier relation that the error will be negligible.

I used four-power Hensoldt lenses for the telescope, which seemed to me at the time to have superior optical features over the three other kinds of telescopes that I bought and examined; but as I knew very



LEFT SIDE OF TELESCOPE AND MOUNTING



TOP VIEW OF TELESCOPE AND MOUNTING

little about optics, the choice was based entirely on the size of the field and the clearness and sharpness of the image.

The tube and some of the fittings were made of magnesium metal alloy to get lightness. I took great pains to make the telescope as near dust and moisture proof as possible. There was no opening into the tube except through tightly fitting screw threads. Narrow ring gaskets of fish paper are used between the lenses and the shoulder on which they rest in the tube and the outer screw caps, and even the reticule focusing mechanism was especially designed for this purpose.

I zeroed the telescope for three hundred yards and cut the range graduation notches by trial shooting from three to eight hundred inclusive at every hundred yards. While hunting I always carried the telescope detached from the rifle in a leather case like ordinary binoculars, and used it only when I had a long shot and plenty of time. The open peep sights which were zeroed for one hundred yards were used for the shorter distances oftentimes occurring in hunting.

The main principles of the telescope sight design worked satisfactorily; that is, the sight retained its original zero which was not affected by repeatedly attaching and detaching; the reticule adjustment remained constant with the original range and deflection graduation notches; and the reticule never stuck in its movement, but seemed to follow the adjustment screws perfectly. The left eye position of the sight seemed to me a distinct improvement, the advantage of which I have previously mentioned.

As to the faults of the sight, the whole sight was too large and heavy, and the carrying case unnecessarily clumsy. The top of the vertical sighting post in the reticule should be cut off square instead of ending in a sharp point, and the two horizontal sight wires entirely omitted. The range and deflection screws should have minute angle clicks. This telescope sight and mounting was patented for me on September 8, 1923, U. S. Patent Number 1,656,496, a complete copy of which follows:

Jan. 17, 1928.

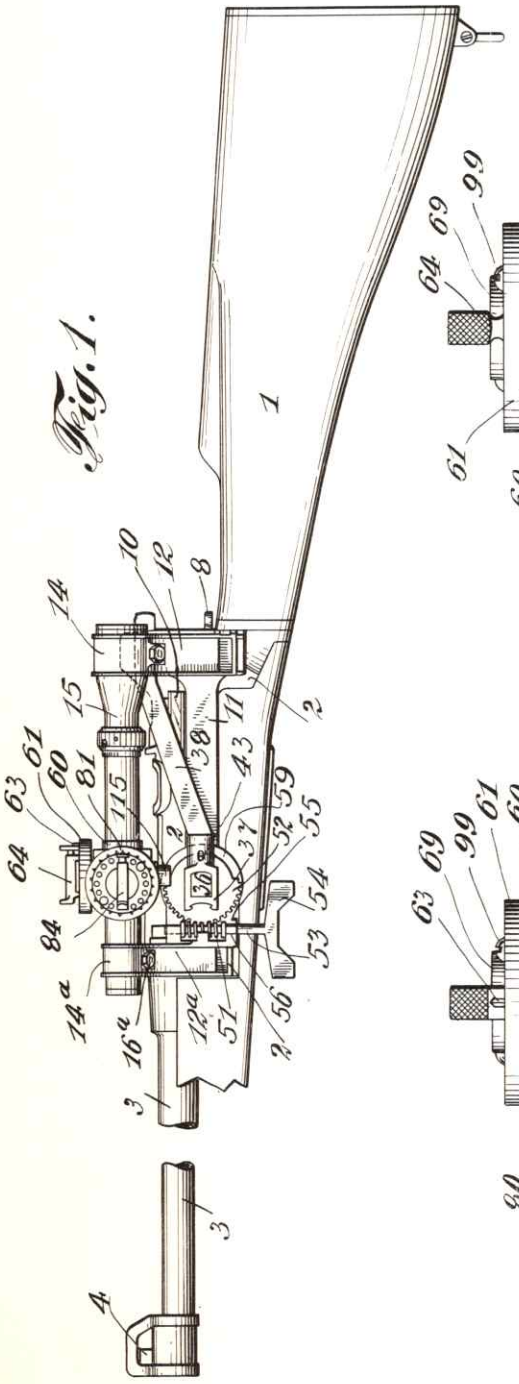
1,656,496

R. G. PACKARD, JR

GUN SIGHT

Filed Sept. 8, 1923

5 Sheets-Sheet 1



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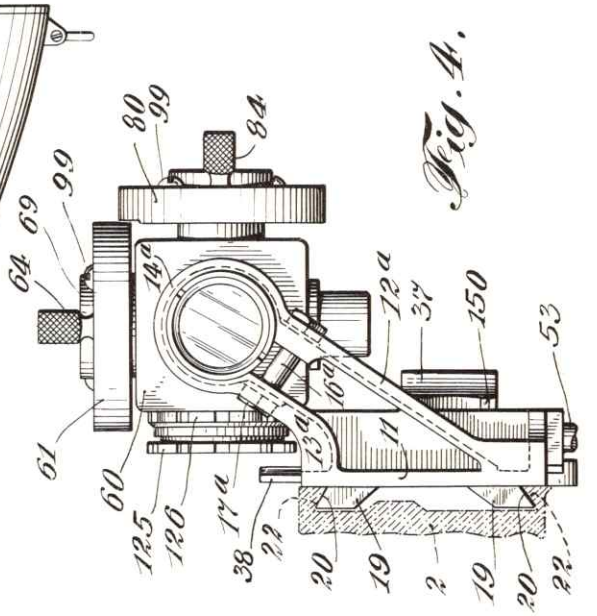

Fig. 4.

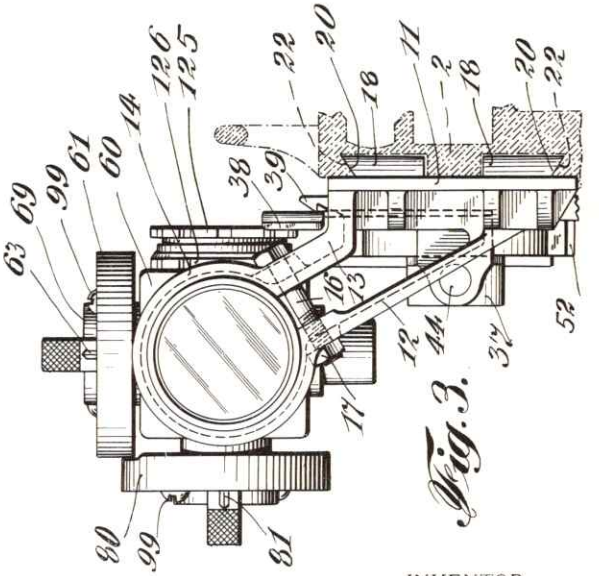

Fig. 3.

INVENTOR

Ralph G. Packard Jr

BY George C. Dean

his ATTORNEY

Jan. 17, 1928. 1,656,496

R. G. PACKARD, JR

GUN SIGHT

Filed Sept. 8, 1923 5 Sheets-Sheet 3

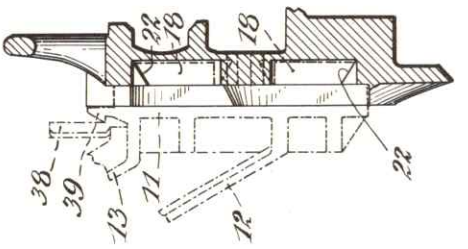

Fig. 6.

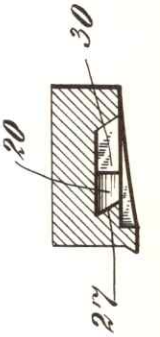

Fig. 7.

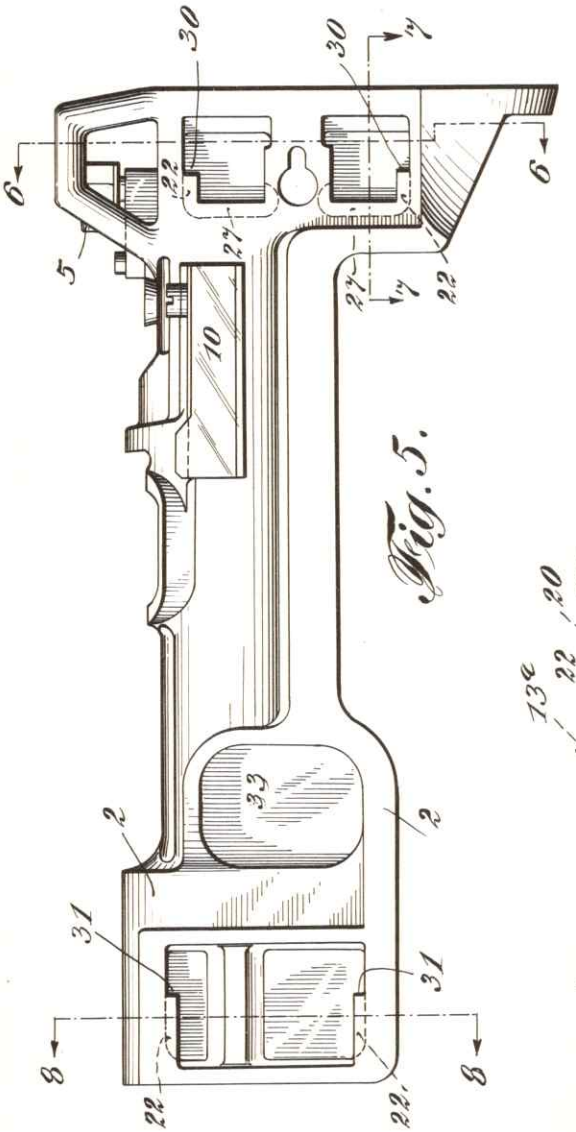

Fig. 5.

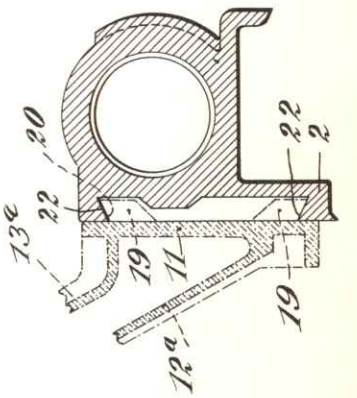

Fig. 8.

INVENTOR

Ralph G. Packard Jr.

BY George C. Sheau

his ATTORNEY

Jan. 17, 1928.

1,656,496

R. G. PACKARD, JR

GUN SIGHT

Filed Sept. 8, 1923

5 Sheets-Sheet 2

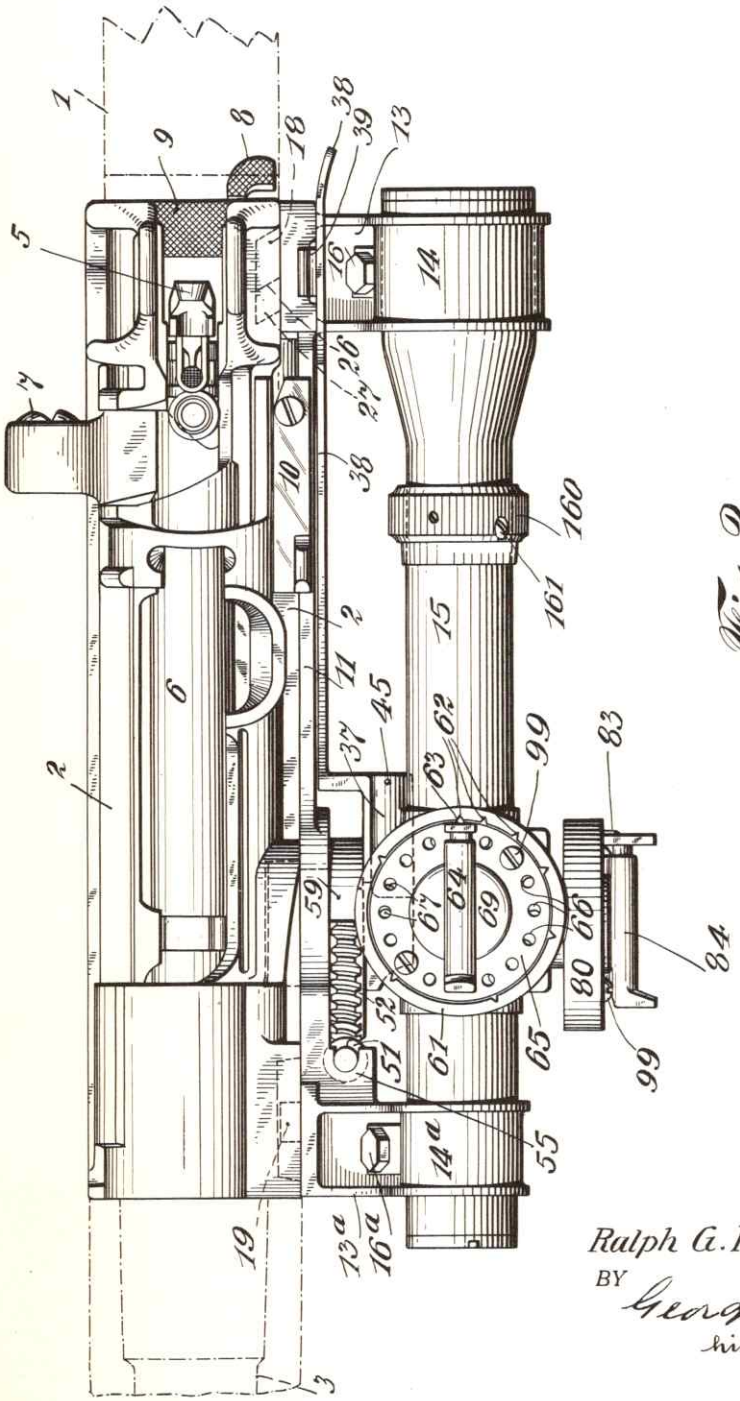

Fig. 2.

INVENTOR

Ralph G. Packard Jr

BY George C. Dean

his ATTORNEY

Jan. 17, 1928. 1,656,496

R. G. PACKARD, JR

GUN SIGHT

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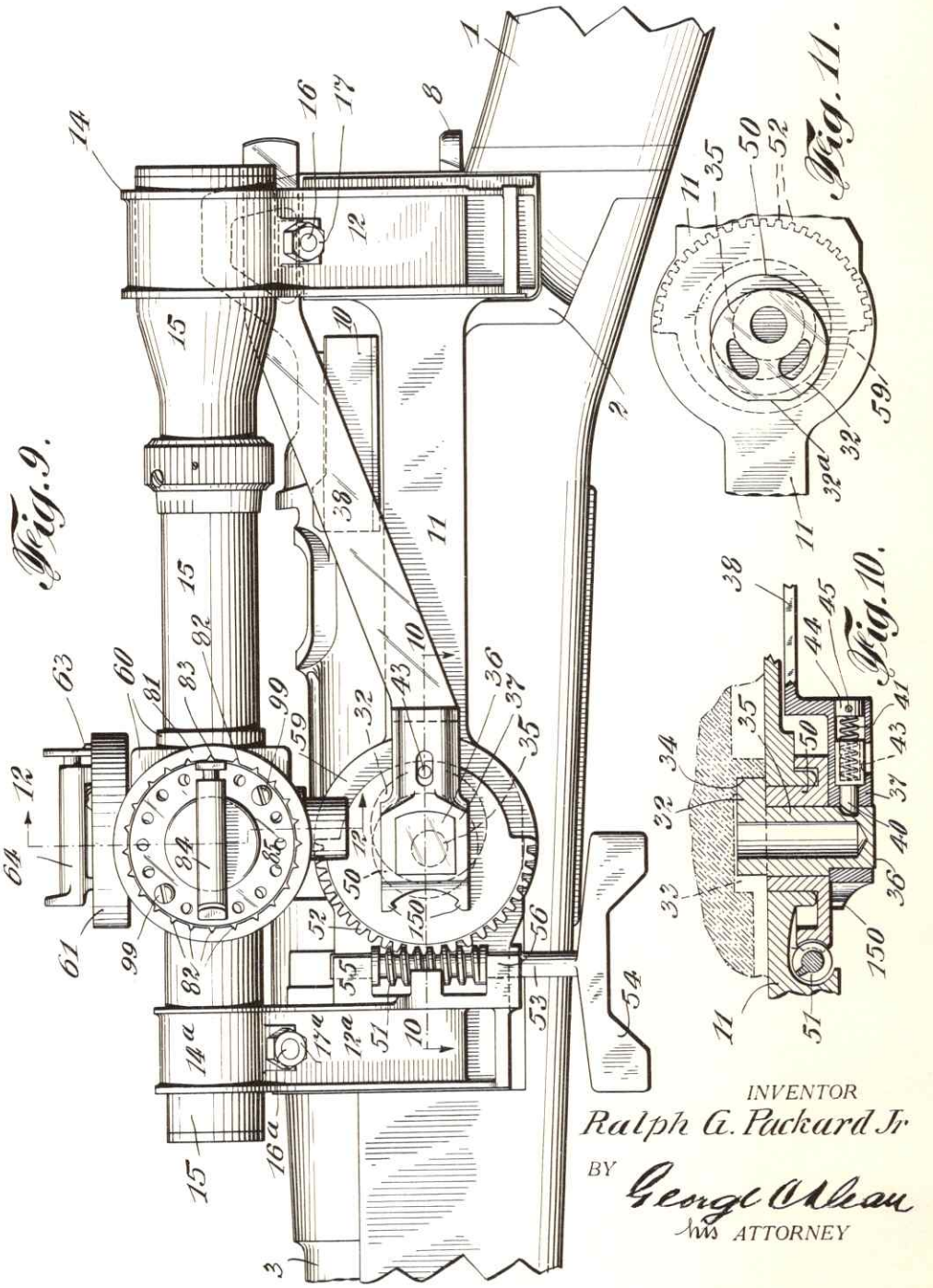


Fig. 9.

Fig. 11.

Fig. 10.

INVENTOR
Ralph G. Packard Jr
BY George Olsen
his ATTORNEY

Jan. 17, 1928. 1,656,496

R. G. PACKARD, JR

GUN SIGHT

Filed Sept. 8, 1923 5 Sheets-Sheet 5

Fig. 12.

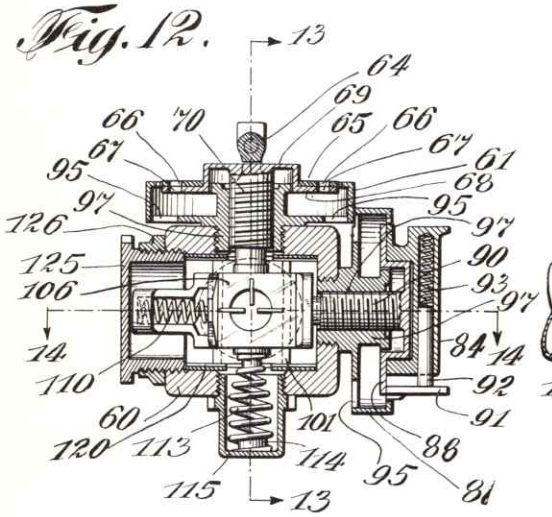
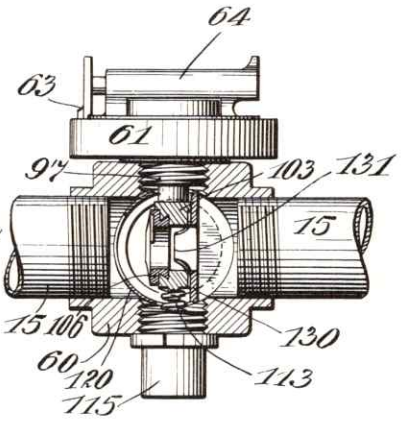


Fig. 13.



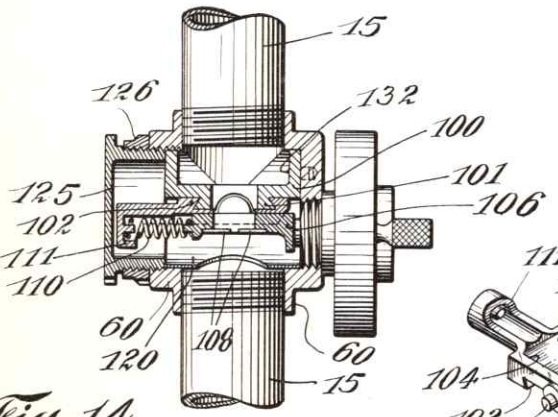
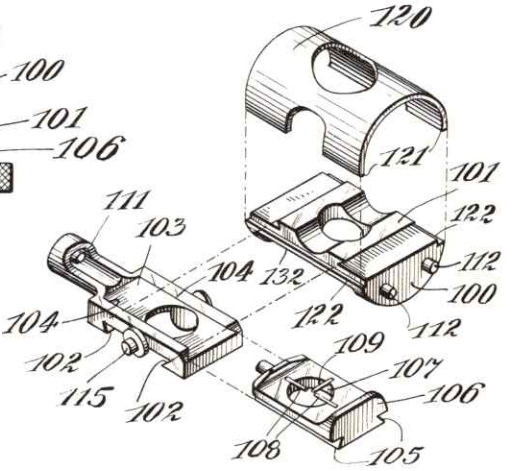


Fig. 14.

Fig. 15.



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GUN SIGHT.

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My present invention relates more particularly to telescopic sights for rifles and many of its important features were primarily devised for their utility in connection with the employment of such sights on high power sporting and military rifles, but certain features of the invention will be found useful on rifles of the less powerful types.

Telescopes for rifle sights have been developed to a point where the problems of high-power, brilliant field and safe mounting for the lenses have been solved to such an extent that it is now entirely practicable to have such telescopes rigidly mounted on rifles even of the highest power without danger that the recoil will disarrange or cause damage to the lenses, reticule or other parts of the telescope. In such arrangements where the mount as a whole has been detachable, the primary securing means has often proved far from rigid under continuous firing of heavy charges and even where the primary attachment has been made absolutely rigid by permanently brazing it to the frame of the rifle, the value of this rigidity has been greatly impaired by the necessity for a secondary mount which is laterally adjusted for windage and drift.

An important feature of my present invention is that the tube of the telescope is non-adjustably secured in fixed relation approximately parallel with the axis of the rifle barrel, the adjustments both for range and windage being both effected without any change in the position of the telescope tube. The desired adjustments are effected, one by a vertical screw and the other by a horizontal screw moving the sight reticule within the telescope tube. I believe I am the first to have successfully combined the horizontal or windage adjustment of the reticule with the vertical adjustment and thus avoiding all adjustment of the telescope tube and making it possible to have a mount which is absolutely fixed as well as rigid.

Another feature of the invention is a detachable securing means for the mount having special adaptation whereby the attachment of the mount to the rifle frame is so tight that jar or shake of the telescope relative to the rifle is impossible, the telescope and its mount recoiling with the gun as if they were all one piece. This and also the certainty of replacing the telescope in exactly the same position every time is contributed to by avoiding the use of the converging wedge dovetail. Hence I prefer to make the dovetail elements parallel with only a straight sliding fit between the parts and I cause the wedging to take effect by direct thrust against transverse under-cut surfaces, cut in or rigid with the frame. Thus in fitting the mount to the rifle, the only particularity is to form the under-cut wedge recesses so that they extend approximately at right angles to the axis of the barrel and the dove-tails so that they extend parallel with said axis. By the use of such directly abutting wedge surfaces, the amount of motion or slide of the mount to reach absolutely rigid wedge engagement is very short. Consequently, the range of movement to be forced by the locking wedge elements is extremely short and they may be of correspondingly low pitch, so as to be of great power and positively self locking against release.

Most telescopes are attached to the receiver by some form of dovetail and all I have seen have been deficient in size of base in the attachment both in the width and length of the dovetails to obtain and hold their accuracy; especially where the fits are loose enough to make the telescope easily detachable. To obviate this defect I have two cooperating sets of dovetails, one at each end of the mounting. This includes a flat bar with projections that fit into pockets at both ends of the receiver as far apart as practicable, in this case, a little over seven inches. I have made the width about two inches, thus giving a width of base greater than the altitude which latter may be taken as distance of the telescope from the point of attachment of its mount. By thus making the base attachment about two inches in width by seven inches long, I correspondingly decrease the inaccuracy which can result from slight variations in reclamping positions when attaching and detaching the telescope without rezeroing. In discharging the rifle it recoils backward and the inertia of the telescope and its mounting tends to keep the latter stationary so by far the greatest strain on the attaching lugs is in the forward direction, that is, toward the muzzle of the gun, and this strain comes bluntly

against the wedging surfaces that are at right angles to the direction of recoil.

I believe that there is also more or less of a back lash or, as you might call it, counter recoil, to the telescope following the recoil of the rifle, and by my invention this jar or back lash tendency will be deprived of effect because the powerful wedge lock means which I employ is tightened to a point where the parts are already under a rigid wedge lock stress much greater than either recoil or counter-recoil.

An entirely new feature of my invention is locating the telescope in what might be called binocular relation to the regular iron sights, that is to say, the regular sights being located so that they are in direct alignment with the user's right eye when the head is resting firmly against the stock in shooting position, the telescope is offset so that its line of sight is in corresponding relation to the left eye of the user. The convenience and practicability of such arrangement of the telescope is contributed to by the fact that these telescopes as now built do not require the sighting eye to be exactly in the axis of the telescope tube and the eye piece being rather large, an average position of the telescope will afford binocular fit of the two sets of sights for different users having quite different distances between the eyes as well as different fits of cheek and jaw against the stock. The average lateral offset of the telescope required to bring the left eye in exact alignment with the axis of the telescope is likely to be about 2⅛ inches from the axis of the barrel and 1¼ inches above said axis. This position gives ample room for operating the bolt to load and unload and does not interfere with the use of the usual clip for loading.

It is not necessary to have the two sets of sights exactly binocular for the further reason that with a properly shaped stock, a correct position for the telescope can be attained, such that when using the left eye a slight shift of the head can be made and still have it steadied, and supported against the stock as well as it is now when using the right eye for the open sights. Some objection may be raised when the left eye has not been trained in aiming as the right eye has but practical experience shows that training is not required of the eye itself in aiming provided the vision of the left eye is as equally good as that of the right eye and for an ordinary marksman the only training required is the recollection to use the left eye with the telescope instead of trying to shift the right eye over to the left eye position.

Thus I find that it is entirely practical to use the left eye with the head properly steadied and supported by the stock as usual when using the open sights, and with the further advantage that the bolt can be operated without interference, the magazine can be charged in the usual manner with or without a clip, and either the telescope or the open sights can be used at will without the removal of either.

The above and other features of my invention may be more fully understood from the following description in connection with the accompanying drawings, in which

Fig. 1 is a side elevation of the telescope and mount as applied to the left side of a rifle;

Fig. 2 is an enlarged plan view of the telescope and mount in position on the frame of the rifle;

Figs. 3 and 4 are respectively rear and front end views of the telescope and mount with the rifle frame shown in shade line section;

Fig. 5 is a side elevation of the receiver frame showing the recesses for engagement by the telescope mount;

Figs. 6, 7 and 8 are detail sections respectively on the lines 6—6, 7—7 and 8—8 of Fig. 5;

Fig. 9 is a side elevation like Fig. 1, but showing the parts on a larger scale and limiting the view of the gun to the frame and adjacent parts;

Fig. 10 is a sectional detail on the line 10—10, Fig. 9;

Fig. 11 is an elevation of the detail of Fig. 10 but viewed from the backside of the mount;

Fig. 12 is a section through the telescope and sighting reticule on the line 12—12, Fig. 9;

Figs. 13 and 14 are detail sections on the lines 13—13 and 14—14 respectively of Fig. 12; and

Fig. 15 shows the parts constituting the sighting reticule and a mounting therefor within the telescope with dotted lines indicating their assembly relations.

In Fig. 1 my telescope sight is shown as applied to a rifle comprising stock 1, receiver frame 2 and barrel 3 provided with the usual iron foresight 4 and rear sight 5. As indicated more clearly in Fig. 2, I have selected for purposes of illustration a gun designed by me which is more fully shown and described in my prior application, Serial No. 565,039, the peculiarities of which are not essential to my present invention and need be mentioned only to the extent of identifying breech bolt 6, operating lever 7, down-pressure safety release 8, down-pressure thumb trigger 9 and bolt releasing member 10. In this particular case the receiver frame, as shown in Fig. 5, is really designed for detachably securing my telescope mount, but it will be evident that the proportions and disposition of the locking elements may be varied to suit the frames of particular guns and it is of course always possible to

braze to any gun frame a plate having the desired locking recesses either modified or, if desired, in the exact form shown in the drawings.

As shown in Fig. 1 and, on a larger scale in Fig. 9, the detachable carriage or mount for the telescope comprises a relatively long rigid bar 11, having preferably integral therewith upwardly extending bracket members 12, 13 terminating at their upper ends in a split or segmental ring clamp 14 adapted to encircle the rear end of the telescope tube 15. Screw means, such as a bolt 16 and nut 17, are provided whereby the ring clamp may be tightened upon the telescope tube with almost any desired pressure. Similar brackets, ring clamp and securing means 12^a, 13^a, 14^a, 16^a and 17^a are arranged at the other end of the bar 11 for similarly clamping the front end of the telescope tube 15.

The bar or base 11 is provided on its frame engaging face with pairs of under-cut projections 18, 18 (see Figs. 2 and 3) and 19, 19 (see Fig. 4) adapted to engage under-cut recesses in the frame (see Fig. 5). Preferably the outwardly presented side 20 of each projection is beveled so that they cooperate for dovetail fit and simple sliding engagement with corresponding under-cut surface 22 in the frame. Preferably these surfaces are parallel in the direction of slide so as to wedge only upon outward stress. Inward wedging under endwise stress is effected by providing the lugs 18, 18 with forwardly presented wedge surfaces 26 which abut directly against the transversely disposed wedge surfaces 27, 27, in the frame. The top and bottom under-cut bearing surfaces 20, 22 being simply close fitting slide surfaces preferably parallel with the axis of the barrel, their length of slide is made great enough to permit the transverse wedge surfaces 26, 26 to contact with the transversely disposed wedge surfaces 27 substantially before the forward lugs approach the ends of their slide recesses. The longitudinal slide recesses on the frame are cut away as at 30—30 for the rear lugs and 31—31 for the forward lugs so that said lugs may be laterally applied to and removed from the frame through said cut away portions.

Since this preferred design of the locking lugs and recesses causes all forward stress on the mount (rearward stress or recoil of the gun) to take effect solely on wedge surfaces 26, a most rigid locking engagement may be had by very slight forward movement of the telescope mount, as before explained. The means for effecting this movement with maximum power and self-locking security is best seen in Figs. 9, 10 and 11. The locking member that takes the thrust consists of an eccentric 32, which fits recess 33 in the frame (see Fig. 5). This eccentric has a square abutment against the rear wall of its recesses as indicated at 34, so that its thrust is directly parallel with the axis of the gun and therefore with the top and bottom dovetail slides above described. An integral extension 35 extends through the bar 11 and it is formed with a head 36 squared or otherwise formed, as shown in the drawing, for engagement by a wrench head 37 which fits the same very closely. In this particular case the fit is such that the wrench can only be applied to the head in one fixed angular position relative to the throw of the eccentric 32 and the wrench is provided with a long handle 38 adapted to be held in the locking position by detent 39 carried by the rear end of the bar 11. The wrench is normally held locked to the head 36 by latch bolt 40 latched by spring 41. Preferably this latch is arranged to be retracted by inserting the point of the bullet of an ordinary rifle cartridge in the conical recess 43. The latch and the spring are held by plug 44 secured by screw 45.

While the eccentric locking element 32 may have a completely circular periphery, giving line contact with a plane rear surface for recess 33, line contact is not safe for the enormous clamping pressures which I desire to apply. I therefore use the said eccentric merely for setting the slide lugs of the carriage up to approximate ultimate position of their transverse wedging surfaces and provide the eccentric with a flat bearing surface 32^a which is parallel with the cooperating bearing surface in recess 33, when the eccentric is locked in its dead center position. Other means for powerfully setting up these surfaces to apply great tension is provided in the form of a rotary bearing 50, which carries eccentrically thereof the pivot shaft 35 of eccentric 32. This rotary bearing is set up by means of a worm 51 engaging a worm segment 52 integral with the periphery of said bearing. This worm is carried by shaft 53 having a wide spread wing handle 54 for turning it. Said shaft 53 is mounted in lugs 55, 56, between which the worm gear fits and against which it thrusts under-screwing and un-screwing efforts. The journals for the shaft are open semi-cylinders so that this worm element may be laterally applied or removed when the peripheral worm gear 52 is out of the way. This may be accomplished by removing the wrench 37 and rotating the worm gear around to bring the blank segment 59 in registry with the worm. Enormous power can be applied through the worm to rotate the eccentric journal and the eccentricity of the latter is so small that this power is again enormously multiplied in its effect upon shaft 35 and the eccentric 32. As the thrust is applied squarely through the flat surface 32^a of the eccentric with the latter on a dead center and locked by lever 38

and detent 39, truly enormous pressures can be applied upon the rear wedges 26, and great strain set up without danger of marring or deforming the steel thrust surfaces. By reason of the overhung position of the flat 32 any minute looseness or play in its bearings tends to take effect as an outward pivotal movement about rear wedges 26 as a center, thus wedging outward the forward dovetail surfaces 20. 22. These as well as the transverse wedge surfaces 26, 27 are so blunt, that is, of such high pitch that they cannot stick against unlocking no matter how powerfully they are set up.

By the above means the telescope and mount become practically integral with the frame of the rifle, with the added advantage which integral construction would not add, namely, that the metal parts which are to take the strain of gun recoil versus telescope inertia, are all stretched so that even minute elastic yield is eliminated. Hence there is only the elasticity of the brackets and these, as will be seen, are extremely massive from rear to front which is the line of the recoil-inertia stress.

It will be noted that the telescope is thus a removable but functionally integral part of the rifle frame, which can be removed and replaced but which cannot be adjusted either for elevation or lateral deflection. While vertically adjustable sights within the telescope offer no particular problem and are well known, it is obvious that for careful, accurate shooting which the necessity for a telescope pre-supposes, windage adjustment at the will of the user is highly desirable and some form of adjustable or permanent accommodation for zeroing and drift of the bullet is absolutely essential. Heretofore this has been taken care of either by troublesome shaping of the original mount to correct errors for zeroing, with no provision for windage or drift adjustment, or else windage and drift have been taken care of by providing a supplemental carriage between a telescope and its mount. Such a supplemental carriage, with its unavoidably insecure adjustment and adjustment locking means, it is one of the objects of my invention to avoid. This I have accomplished by transferring the deflection adjustment from the exterior mount to the sighting reticule within the telescope. This involves difficulties which I believe I am the first to solve. Referring to Figs. 1 and 2, it will be seen that the telescope barrel is divided (see Figs. 13 and 14) and a tubular frame segment 60 is inserted. This carries an upper casing 61, the top of which is provided with a range scale indicated by notches 62 (see Fig. 2) adapted to be laterally engaged by spring detent 63 housed in hand rotatable barrel 64 carried by a ring disc 65 having (see Fig. 12) a series of evenly spaced perforations 66 in vernier relation to a series of holes 67 in an underlying portion 68 of head 69 of vertical adjusting screw 70.

There is a precisely similar external means for lateral adjustment, comprising the circular case 81 with notches 82, detent 83, hand-piece 84, vernier ring 85 supported on the annulus 88 having cooperating vernier holes, and integral with lateral adjusting screw 90. In the latter device the detent construction of both devices is clearly indicated as supported by a head 91 carried by a shank 92 sliding in the hand-piece 84 and backed by spring 93.

Both casings 61 and 81 are provided with drainage holes 95 as shown and they are integral with internally threaded barrels 97 in which are adjustably mounted the screws 70 and 90 respectively. The detent plate 65 is secured to its support annulus 68 in practically any desired angular relation by means of screws 99, 99, and the annulus 85 is similarly secured by screws 99, 99.

As shown best in Figs. 12 to 15, within the barrel section 60 is fitted a piece 100 formed on its front face with vertically extending dovetail slides 101 adapted to be engaged by a cooperating dovetail surface 102 on a primary carriage 103 which is in turn provided with transverse dovetail slides 104 adapted to be engaged by the corresponding dovetail 105 on the secondary carriage 106. The latter carriage is centrally formed with the sighting reticule including a circular pasage 107 into which project the lateral sighting posts 108 and the vertical sighting post 109.

One end surface of secondary carriage 106 has sliding engagement with transverse adjusting screw 90 against which it is forced by a spring 110 anchored by centering pin 111 which is integral with the primary carriage 103. The primary carriage is depressed vertically along the slideway 101 by means of the vertical screw 70 and is powerfully spring-pressed in the upward direction by spring 113 anchored on pin 114 in cup 115 which is screw-threaded in section 60 as shown. The other end of spring 113 is centered on the primary carriage by a pin on the latter.

The segmental piece 100, which supports the slide, is formed outwardly as a segment of a cylinder and there is a cooperating cylindrical segment 120 the edges of which 121 fit rabbets 122 in said piece 100 so as to form therewith a complete cylinder. This cylinder accurately fits casing 60 and its proper angular position therein is assured by key pins 112 on the end of segmental piece 100.

As indicated in Fig. 15, the secondary carriage 106 may be slid into the ways 104 on primary carriage 103; with spring 110 in position thereon, the primary carriage

may then be slid into engagement with the ways 101 and the cylinder piece 120 applied. The parts thus assembled may then be slid endwise into the casing of barrel 60, from the lefthand end (Fig. 12) and there tightly clamped by means of screw cap 125 secured by lock nut 126. Spring 113 may then be assembled in cup 115 and the latter screwed in position through the bottom of 60. If desired, a diaphragm 130 (Fig. 13) having a central cone leading to circular aperture 131 may be inserted in the recess 132 which is formed by cutting away a portion of the back of the slide piece 100.

With this arrangement for independent lateral and vertical adjustment of the sighting reticule, in combination with the first above described method for accurately locking the telescope in immovable relation to the frame of the gun, it is only necessary to have the axis of the telescope reasonably near parallel with the axis of the barrel, the important thing being that the position assumed is substantially the same every time the telescope is removed and replaced.

These conditions being fulfilled and the sight being rigidly in place on the gun, a very fine adjustment for zeroing of the rifle may be had by repeated shots with trial adjustments of the thumb piece 84 until the sights are correct for lateral alignment. Then the screws 99 may be removed and the hand-piece placed with the detent 83 in the desired zero notch, in which position the vernier arrangement of the screw holes above described will result in having two of the holes in substantial alignment and through these holes the screws 99 may be inserted and screwed home. The rifle being thus permanently zeroed for lateral alignment, any desired subsequent lateral adjustments for windage and drift, may be made by merely rotating the hand-piece 84 one or more notches. These index notches are preferably equally spaced so that each notch means an equal number of inches lateral adjustment for each given range.

The zeroing and adjustment of the rifle for range is accomplished in precisely the same way except the screw 70 and hand-piece 64 are the rotatable elements. In this case, however, each notch corresponds to a correct elevation for one particular range. Hence these notches are not equidistant, but the precise position of each notch may be predetermined for a standard cartridge and rifle. Then the zeroing may be effected for each individual rifle by trial shots, adjustments and resetting of the vernier for the ascertained zero, as in the case of the lateral adjustment described above.

Theoretically considered, my vernier arrangement of screw holes does not admit of locking the index to the adjusting screw precisely at every possible angle but with holes as large as one-eighth inch we may have say 20 holes in the screw head series for say 16 holes in the index annulus and, with two holes matching, the error will be only one eightieth of a revolution of the adjusting screw $\frac{1}{(16\times 5)}$ and as the thread of this screw is preferably fine, the resulting error in zeroing is likely to be less than the error due to variations in ammunition and inaccuracies of the observer in trial targeting. This vernier arrangement for zeroing will be found useful on any screw that is used for adjusting any kind of a rifle sight.

By reference to Figs. 12, 13 and 14 it will be seen that all openings in the reticule casing 60 are sealed water-tight and dust-tight by screw means that can be accurately fitted. The screw joints for screwing the telescope tube sections can be permanently brazed if desired. The bushings which carry the stationary scales and adjusting screws are provided with ample clamping shoulders that may be set up as tightly as desired. The same thing is true of the casing 115 for spring 113. The closing cap 125 is provided with a locking ring 126, which may also be set up as tightly as desired. A convenient means for this is provided in the form of the spanner projections 150, 150, on wrench-head 37. This leaves only the screws 70 and 90 and these are formed with long shanks and fine threads accurately fitting the screw threaded passages. The springs 110 and 113 respectively force these threads into continuous one-direction engagement, thus tending to make them tight against water and dust, as well as taking up any trace of back-lash. Moreover, the heads of the screws are in cup form, closing and substantially protecting these screw threads against access of water by any exposure short of complete submersion. In this way I have succeeded in making the sight reticule laterally as well as vertically adjustable while maintaining the interior of the telescope substantially dust-tight and water-tight.

A further important feature is that the sighting reticule and the mount therefor may be instantly removed from or replaced in the casing without the use of any special tools, the spanner on the wrench-head and the bullet or other pointed instrument being all that is necessary even in case all of the screws are set up under extreme stress.

While the telescope may be of the focusing type, I prefer to use the universal focus type which can be permanently secured by the clamps 14, 14ª. Usually, however, even the latter type require some focusing to bring the cross hairs or sighting points into sharp focus for the eye of the user. This feature, however, does not particularly concern

my present invention and I have therefore merely indicated at 160 a well known type of rotatable adjustment ring for longitudinally adjusting the inverting lenses by means not shown. This ring is secured in desired position of adjustment by lock screw 161.

For the sake of clearness, I have shown and described the wedge hooks, that is, the forwardly directed wedge surfaces 26, 27 at the rear of the mount as being exactly transverse to the axis of the barrel and the surfaces 20, 22 as being exactly parallel therewith. It will be evident, however, that the essential condition is that these surfaces be free from small angle convergence in the direction of the great stress set up by the locking eccentric 32 and its eccentric journal 50. Such small angle convergence is practically universal in prior removable mounts and in all of them this feature renders devices practically inoperative because when the necessary great stress is applied to force small angle convergence, the steel can easily be forced into such intimate engagement that removal of the mount requires, at the best, powerful blows of the mallet and at the worst it may even be that the mount is locked beyond possibility of removal except by violence that will destroy it. Hence it is the essence of my invention, not that the wedge surfaces 26, 27 are absolutely transverse, but rather that the effected pitch of the wedges in the direction of the locking strain is a high angle preferably greater than the angle of slip of the surfaces.

Even so, under certain conditions the wedge surfaces may tend to stick, but I provide for breaking the stick contact by making the recesses 33 of such size that the eccentric 32 will wedge against the forward end thereof when the lever 38 rotates it to the unlocked position. This leaves the mount loose in the hands of the operator.

One important reason why the forward longitudinal dovetails 20, 22 do not have to be longitudinally wedging is that the area of the flat 34 on eccentric 32 is so great and the pressure applied through it is so powerful and its distance from the surfaces 26, 27 is so great that the mount is held in position at the forward end with great security, even independently of the forward dovetails 20, 22.

I claim:

1. A gun comprising barrel, stock and firing mechanism in combination with two sets of sighting means designed for optional use, secured to the gun, one in approximate alignment with one eye and the other in approximate alignment with the other eye when the cheek of the user is in normal position of rest against the stock in the firing position, one of said sets comprising a non-telescopic front and rear sight aligned in the medial plane above the barrel and the other being a telescope offset from the rear sight a distance approximately equal to the distance between the eyes of the user.

2. A gun comprising barrel, stock and firing mechanism including breach bolt, firing plunger and cocking piece in combination with two sets of sighting means designed for optional use, secured to the gun, one in approximate alignment with one eye and the other in approximate alignment with the other eye when the cheek of the user is in normal position of rest against the stock in the firing position, one of said sets including a peep sight on the cocking piece of the firing plunger aligned for sighting along a medial plane above the barrel and the other set being embodied in a telescope secured to the side of the gun with its line of sight on approximately the level with that of the same peep sight, and the rear end of the telescope being located near the same transverse plane with the peep sight.

3. A gun comprising barrel, stock and locking mechanism in combination with two sets of sights secured to the gun, one in approximate alignment with one eye and the other in approximate alignment with the other eye when the cheek of the user is in normal position of rest against the stock in the firing position, one of said sets being non-telescopic front and rear sights aligned in a medial plane above the barrel and the other being a telescope rigidly and non-adjustably secured to the gun, offset on the left side of the gun, a distance approximately equal to the distance between the eyes of the user; said telescope having an interior sight reticule and means for adjusting said reticule both horizontally and vertically.

4. A gun comprising barrel, stock and locking mechanism including breach bolt, firing plunger and cocking piece in combination with two sets of sights secured to the gun, one in approximate alignment with one eye and the other in approximate alignment with the other eye when the cheek of the user is in normal position of rest against the stock in the firing position, one of said sets including a peep sight on the cocking piece of the firing plunger aligned for sighting along a medial plane above the barrel and the other set being embodied in a telescope non-adjustably secured to the left side of the gun with its line of sight on approximately the same level with the peep sight, and the rear end of the telescope being located near the same transverse plane with the peep sight; said telescope having an interior sight reticule and means for adjusting said reticule both for elevation and for deflection.

5. A gun including barrel, frame, stock and firing mechanism, in combination with

a sighting telescope and means for detachably mounting it on the gun, including a rigid bar or frame member having an under-cut wedging surface extending vertically at right angles to the axis of the barrel and a dovetail extending lengthwise of said axis, both fitting correspondingly shaped recesses on the frame, in combination with a rotating cam member fitting with and bearing upon a thrust surface of a recess on the frame and power multiplying means for rotating said cam to force said bar member along said dovetail and said vertically extending wedging surfaces into intimate engagement with the corresponding wedge recesses on the frame.

6. A gun including barrel, frame, stock and firing mechanism, in combination with a sighting telescope and means for detachably mounting it on the gun, including a rigid bar or frame member having an under-cut wedging surface extending vertically at right angles to the axis of the barrel and a dove-tail extending lengthwise of said axis, both fitting correspondingly shaped recesses on the frame, in combination with a rotating cam member fitting with and bearing upon a thrust surface of a recess on the frame and power multiplying means for rotating said cam to force said bar member along said dovetail and said vertically extending wedging surfaces into intimate engagement with the corresponding wedge recesses on the frame; said cam being approximately circular but having a flat bearing surface at the point of contact when in the locking position and means for bodily moving the cam to force said flat into rigid abutment against said thrust surface.

7. A gun including barrel, frame, stock and firing mechanism, in combination with a sighting telescope and means for detachably mounting it on the gun, including a rigid bar or frame member having an under-cut wedging surface extending vertically at right angles to the axis of the barrel and a dove-tail extending lengthwise of said axis, both fitting correspondingly shaped recesses on the frame, in combination with a rotating cam member fitting with and bearing upon a thrust surface of a recess on the frame and power multiplying means for rotating said cam to force said bar member along said dove-tail and said vertically extending wedging surfaces into intimate engagement with the corresponding wedge recesses on the frame; said cam being approximately circular but having a flat bearing surface at the point of contact when in the locking position and means for bodily moving the cam to force said flat into rigid abutment against said thrust surface, said latter means including a rotatable eccentric in which said cam is journalled.

8. A gun including barrel, frame, stock and firing mechanism, in combination with a sighting telescope and means for detachably mounting it on the gun, including a rigid bar or frame member having a forwardly presented under-cut wedging surface extending at right angles to the axis of the barrel and a dovetail parallel with said axis, both fitting correspondingly shaped recesses on the frame, in combination with a rotating cam member fitting into and bearing against the rear wall of a recess on the frame; and power multiplying means for rotating said cam to force said bar member forwardly along said dovetail and said forwardly directed wedging surfaces into intimate engagement with the corresponding wedge recesses on the frame, said cam being approximately circular but having a flat bearing surface at the point of contact when in the locking position and means for bodily moving the cam to force said flat into rigid abutment against the rear wall of its recess; said latter means including a rotatable eccentric in which said cam is journalled, and a worm gear for rotating said eccentric journal.

9. A gun including barrel, frame, stock and firing mechanism in combination with a sighting telescope and means for detachably mounting it on the gun, including a rigid bar or frame member having an under-cut wedging surface extending at right angles to the axis of the barrel and a dovetail extending lengthwise of said axis, both fitting correspondingly shaped recesses on the frame, in combination with locking wedge means for forcing said bar member along said dovetail and said wedging surfaces into direct intimate engagement with the corresponding wedge recesses on the frame.

10. A gun including barrel, frame, stock and firing mechanism in combination with a sighting telescope and means for detachably mounting it on the gun, including a rigid bar or frame member having an under-cut wedging surface extending at right angles to the axis of the barrel and a dovetail extending lengthwise of said axis, both fitting correspondingly shaped recesses on the frame, in combination with low pitch rotary wedging means and a rotating and locking screw for rotating said low pitch rotary wedging means to force said bar member along said dovetail and said wedging surfaces into intimate engagement with the corresponding wedge recesses on the frame.

11. A telescopic gun sight, including a telescope and a carriage therefor including rigid telescope clamps and means for immovably locking the mount to the gun including under-cut wedge surfaces on the mount and corresponding under-cut wedge surfaces on the gun, said wedging surfaces being arranged to wedge by relative movement longitudinally, in the direction of recoil and

counter-recoil, in combination with power multiplying wedging means for stressing said wedging surfaces towards wedging engagement.

12. A telescopic gun sight, including a telescope and a carriage therefor including rigid telescope clamps and means for immovably locking the mount to the gun including under-cut wedge surfaces on the mount and corresponding under-cut wedge surface on the gun and power multiplying wedging means for stressing said wedging surfaces towards wedging engagement and means for further engaging the parts with great stress including a rotary journal in which said wedging means is eccentrically mounted and means for rotating said journal.

13. A telescopic gun sight, including a telescope and a carriage therefor including rigid telescope clamps and means for immovably locking the mount to the gun including cooperating bearing and under-cut wedging surfaces on the gun, engaged by corresponding bearing and wedging surfaces on the mount, the wedging surfaces on the gun being rearwardly presented so that the wedging is by stress in the direction of recoil of the gun, in combination with wedge locking means applying thrust in a plane approximately at right angles to said wedging surfaces to force them directly into intimate wedging engagement.

14. A telescopic gun sight, including a telescope and a carriage therefor including rigid telescope clamps and means for immovably locking the mount to the gun including under-cut wedge surfaces on the mount and corresponding under-cut wedge surfaces on the gun and power multiplying wedging means for stressing said wedging surfaces towards wedging engagement and means for further forcing the cam including a rotary journal in which said cam is eccentrically mounted and means for rotating said journal; said under-cut wedge surfaces being forwardly directed to sustain the inertia thrust of the mount when the gun is fired and the initial clamping pressure of the cam forcing means being great as compared with the maximum inertia thrust.

15. A telescopic gun sight, including a telescope and a mount therefor including rigid telescope clamps and means for immovably locking the mount to the gun including under-cut wedge surfaces on the mount and corresponding under-cut wedge surfaces on the gun and a cam of low pitch and a lever for rotating the cam to feed said wedging surfaces into proximate engagement; and means for further forcing the cam including a rotary journal in which said cam is eccentrically mounted and means for rotating said journal; said under-cut wedge surfaces being forwardly directed to sustain the inertia thrust of the mount when the gun is fired and the initial clamping pressure of the cam forcing means being great as compared with the maximum inertia thrust.

16. A sighting telescope and means for rigidly and non-adjustably fixing the telescope on a gun with its axis in approximate parallelism with the axis of the gun barrel, in combination with a sighting reticule within the telescope tube and means for adjusting said reticule with respect to the telescope, vertically for elevation and transversely for windage or drift, said means including vertical and transverse screws each having an exterior head rigid therewith and an indexing head rotatably secured to said screw head in operative relation to a stationary sight-adjustment scale, said indexing head being secured to said screw head in desired zeroed relation by locking screws engaging circularly arranged recesses in vernier relation, in said member and head respectively.

17. A sighting telescope having a sighting reticule within the telescope tube and means for adjusting said reticule with respect to the telescope, said means including a screw having an exterior head rigid therewith and a supplemental indexing member secured to said head in operative relation to a stationary sight-adjustment scale, said indexing member being positively locked to said head in desired zeroed relation by two sets of circularly arranged screw holes in vernier relation, in said member and head respectively, and screw locking means engaging registering holes of the respective sets.

18. A sighting telescope having a sighting reticule within the telescope tube and means for adjusting said reticule with respect to the telescope, said means including a screw having an exterior head rigid therewith and a supplemental indexing member secured to said head in operative relation to a stationary sight-adjustment scale, said indexing member being positively locked to said head in desired zeroed relation by two sets of circularly arranged screw holes in vernier relation, in said member and head respectively, so that two diametrically opposite holes of each series are in proximate registry in all angular positions and a screw engaging each pair of registering holes and clamping said member and said head in fixed relation.

19. A gun sight and a screw for adjusting it, said screw having a head in operative relation to a stationary adjustment scale and means whereby the screw may be zeroed in any desired position of adjustment, said means including an index plate which can be rotated to the scale zero without rotating the screw; and means for positively locking the screw head and said index member in said zero position, including clamping screws and two series of screw holes in said member and in said head respectively, in vernier relation, the clamping screws being

secured through registering holes of the two series.

20. In combination, a gun sight, a screw for zeroing and for field adjustments of said sight, a member on the screw to turn the same, and a second member adjacent which the first mentioned member moves, one of said members having an index and the other having a scale to indicate the field adjustments of the screw from zeroed position, and the member on the screw being adjustable thereon to enable it to be shifted to zero indication after the zeroing adjustment without shifting the screw.

21. In combination, a gun sight, a screw for zeroing and for field adjustments of said sight, a member on the screw to turn the same, a second member adjacent which the first mentioned member moves, one of said members having an index and the other having a scale to indicate the field adjustments of the screw from zeroed position, and the member on the screw being adjustable thereon to enable it to be shifted to zero indication after the zeroing adjustment without shifting the screw, and detent means for detaining the screw in different positions of adjustment.

22. In combination, a gun sight, a screw for zeroing and for field adjustments of said sight, a member on the head of the screw to turn the same, and a second member adjacent which the first mentioned member moves, one of said members having an index and the other having a scale to indicate the field adjustments of the screw from zeroed position and the member on the head of the screw being adjustable thereon to enable it to be shifted to zero indication, after zeroing adjustment, without shifting the screw, and means for securing the first mentioned member to the head of the screw in desired zeroed relation, said securing means including sets of cooperative elements, circularly arranged in vernier relation, in such member and head respectively.

Signed at New York city in the county of New York and State of New York this 7th day of September, A. D. 1923.

RALPH G. PACKARD, JR.

I wanted to improve on this telescope sight so I designed another which was a good deal smaller and more compact, and also had some improvements in the mounting for attachment to the receiver of this same rifle. The optical part of this telescope was made by Fecker. The adjustment for range in the telescope tube was positive by a threaded stem which formed a part of the reticule. The deflection adjustment was spring pressed. Both the range and deflection adjustment were in half minute of angles, one revolution of the dial head giving an adjustment of one degree. Using the 220 grain mushroom Express for the 30-06 Remington Cartridge, I found that zeroing the dial at two hundred and fifty yards, one revolution of the dial, or an elevation of one degree, gave me a range of one thousand yards.

The sighting post for the reticule was of triangular section, with the flat surface towards the eye. It was ten-thousandths of an inch broad, sloping up at the top to a flat of about two-thousandths of an inch in width. This flat was sloped down away from the eye. I found in using a round wire post there seemed to be some reflection of light on account of its circular shape, causing the post to blur, which was not the case with a post of triangular design which presented definite straight lines to the eye. Great trouble was experienced in the making of this post, and we had to make special fixtures to grind it out of round tungsten steel wire.

I patented the telescope itself on May 31, 1927, U. S. Patent Number 1,704,059, which is shown; and I also patented the mounting on May 31, 1927, U. S. Patent Number 1,704,060. I show two of the patent drawings.

This telescope and mount were both used in the thumb-trigger rifle last described. The telescope was much lighter and smaller, and the mount lighter. The locking mechanism of the telescope mount to the receiver was different and much better to the previous mount described. It consisted of a combination of toggle joint lever and eccentric with screw-holes through the main lever and into the head of the eccentric which were in vernier relation and allowed a fine enough adjustment to take up all wear.

March 5, 1929. R. G. PACKARD, JR 1,704,059

SIGHTING TELESCOPE FOR RIFLES

Filed May 31, 1927

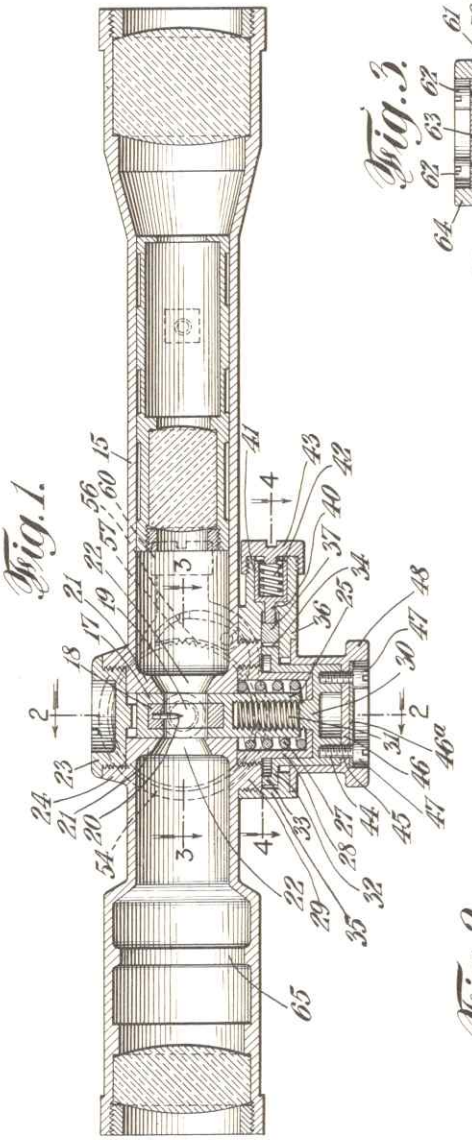


Fig. 1.

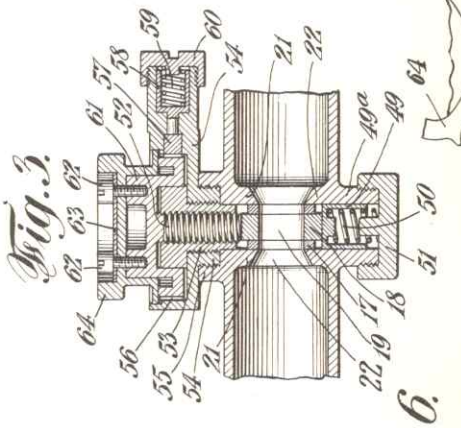


Fig. 2.

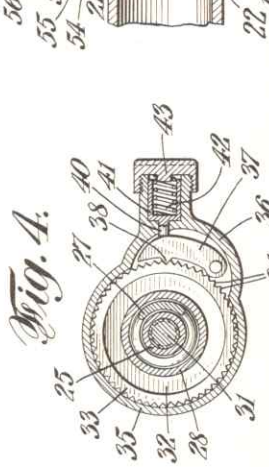


Fig. 4.

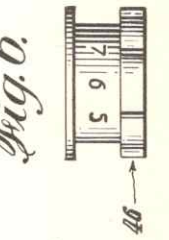


Fig. 6.

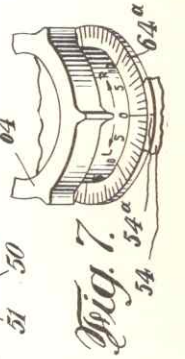


Fig. 7.

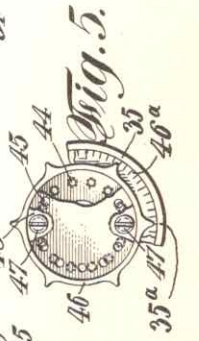


Fig. 5.

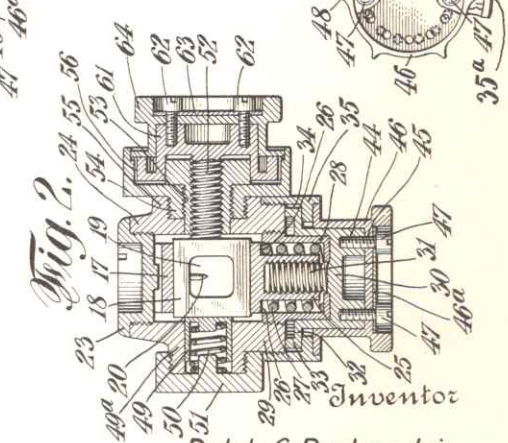


Fig. 2.

Inventor

Ralph G. Packard jr.

By his Attorney

George C. Beal

Patented Mar. 5, 1929. 1,704,059

UNITED STATES PATENT OFFICE.

RALPH G. PACKARD, JR., OF MORRISTOWN, NEW JERSEY.

SIGHTING TELESCOPE FOR RIFLES.

Application filed May 31, 1927. Serial No. 195,357.

My present invention relates more particularly to telescopes adapted to be utilized for telescopic sights for rifles and many of its important features were primarily devised for their utility in connection with the employment of such sight on high power sporting and military rifles.

By my present invention, the telescope may be rigidly mounted on a rifle of the highest power without danger that the recoil will disarrange the sighting adjustment or cause damage to the lenses, reticule or other parts of the telescope. To this end, I provide improved means for combining the horizontal or windage adjustment of the reticule with the vertical adjustment, thus avoiding adjustment of the telescope tube and making it possible to have a mount which is absolutely fixed as well as rigid.

Other features of the invention relate to the telescope tube constructed and arranged to provide the desired rigidity and ease of assembly, and adjustment; the use of a reticule having but a single sighting post; novel means for supporting the reticule for adjustment in two directions at right angles to each other; means for moving said reticule positively both to advance and return movements; and screw means for moving said reticule positively both in advance and return movements a 'd means for preventing back lash.

The above and other features of my invention may be more fully understood from the following description in connection with the accompanying drawings, in which

Fig. 1 is a vertical longitudinal section;

Fig. 2 is a section along 2—2 of Fig. 1;

Fig. 3 is a section along the line 3—3 of Fig. 1;

Fig. 4 is a section along the line 4—4 of Fig. 1;

Fig. 5 is a detail view illustrating a vernier arrangement for adjusting the connection between a handle and a handle-operated part, and showing graduations for use in setting the handle;

Fig. 6 is a detail view of a handle showing markings corresponding to different ranges; and

Fig. 7 is a view illustrating the handle for effecting the lateral adjustment of the reticule, and showing markings thereon for use in effecting the proper setting.

Referring to Figs. 1, 2 and 3, it will be seen that the telescope tube or barrel 15 is so formed at an intermediate point as to provide a guideway for a vertically movable slide or primary carriage 17, extending across the axis of the telescope and that the primary carriage is slotted transversely of the axis of the telescope to form a guideway for a secondary carriage 18, which is centrally formed with the sighting reticule including a central passage 19 into which projects a downwardly extending sighting post 20 which I have found practicable to use alone instead of a plurality of vertical and horizontal posts.

The guideway for the primary carriage 17 is formed between two inwardly projecting annular flanges 21 in a thickened portion of the tube 15 having central openings 22 flaring outwardly toward the ends of the tube 15. This guideway extends to the upper side of the tube 15 and is closed by a cup or cover 23 screwed into the interior of an upwardly projecting annular flange 24. The cover 23 may be provided at opposite sides thereof with notches adapted for engagement by a suitable instrument to apply or remove the cover.

Projecting downwardly from the lower edge of the carriage or slide 17 is an internally threaded tube or sleeve 25 of a diameter substantially the same as the thickness of the carriage 17 and leaving at opposite sides thereof shoulders 26 adapted to be engaged by a spring 27 surrounding the tube and engaged at its lower end by the bottom wall of a cup or cup-shaped member 28 threaded into the interior of an annular flange 29 projecting downwardly from the tube 15. Fitting over the cup 28 is a cup-shaped head of a screw 30 having a threaded shank 31 extending through a hole in the bottom of member 28 and screwed into the tube 25. The cup-shaped head of the screw is provided at its edge with an outstanding flange 32 having at its outer edge an upwardly projecting flange 33 engaging the lower end of the annular flange 29 and having at its outer face a series of ratchet or detent teeth 34.

Screwed on the exterior of the flange 29 is a member 35 provided with a flange engaging the lower surface of the flange 32 and holding the screw 30 against downward movement or movements away from the tube 15. The member 35 is also provided at one side wtih an enlargement 36 providing a housing for a pivoted pawl 37 having a tooth 38 engaging the teeth 34. At its outer side the pawl 37 is engaged by a pin 40 projecting through the casing from a thimble 41 slid-

able in a recess in said enlargement 36 and pressed inwardly by a helical spring 42 positioned therein and engaged at its outer end by a cap 43 threaded on a tubular projection of said enlargement 36 and adapted to be turned in any suitable manner as by a screwdriver applied in a groove in the outer face thereof.

Projecting downwardly from the head of the screw 30, is an annular flange having in its lower face a series of screw holes 44 in vernier arrangement with holes 45 in the bottom of a cup or cup-shaped member 46 having at its upper edge an outstanding flange seated in a groove in the lower face of member 35. The screw 30 and the member 46 are adjusted with reference to each other by bringing the proper holes 44 and 45 into register at diametrically opposite positions and secured in such adjusted position by means of screws 47 passed through a plate 48 at diametrically opposite points and through the selected holes 40 and screwed into the corresponding holes 39.

The adjustment of the reticule for elevation may then be made by turning member 46, which is formed at its lower end as a suitable hand-piece or finger-piece to the proper position as determined by suitable indications on the relatively shiftable parts.

The means for lateral adjustment of the reticule which is similar in many respects to that for vertical adjustment, will now be described.

The secondary carriage 18 is spring-pressed in one direction and screw-pressed in the opposite direction. As seen in Fig. 2, the carriage 18 is slidably engaged at the left by the bottom of a thimble 49 slidably mounted in a boss 49^a on the side of the tube 15 and spring-pressed inwardly by a helical spring 50 extending inside the thimble and engaging at one end the bottom of the thimble and at its outer end by a cap or cover 51 screwed on the boss 49^a and having a positioning lug extending into the outer end of the spring.

At the side opposite the thimble 49, the secondary carriage 18 is engaged by the end of the threaded shank of a screw 52, said shank being screwed into a member 53 which in turn is threaded into a member 54 having an externally threaded portion screwed into an annular boss 55. The member 54 has a flange engaging the outer end of the boss 55 and engaged at its outer face by the head of the member 53. The head of the screw 52 is provided with an annular portion lying between a peripheral flange of the member 54 and the head of the member 53, and this annular portion of the screw head is provided around its periphery with detent teeth 58 engaged by a pawl 57 mounted in an enlargement of the member 54 and engaged in turn by a pin projecting inwardly from a thimble 58 slidably mounted in said member 54 and pressed inwardly by a spring 59 engaged at its outer end by a cap 60 screwed on a projecting portion of the member 54.

At its outer side, the head of the screw 52 is provided with an annular flange 61 of less external diameter than the toothed portion and having attached thereto by screws 62 and a plate 63, a handle or finger piece 64, which is provided at its inner side with a flange engaging the outer edge of the toothed portion of the screw 52, the screws 62 being used in two sets of holes having a vernier arrangement of the same general sort as in the device to adjust for elevation.

It will be evident that, inasmuch as both the primary carriage and the secondary carriage carried thereby are supported and shifted by the screw 30, the feature of having positive movement of the primary carriage both up and down is of great importance. As far as the lateral control of the secondary carriage is concerned, very little force is required to hold or shift this carriage laterally. Furthermore, in use the greatest shocks are likely to occur in a vertical direction, as for example when used on a gun the tendency is for the recoil of the gun to swing the gun vertically rather than laterally.

In view of the great pressure which may be exerted on the telescope tube by the holding clamps therefor, the tube 15 may be provided at its forward end with an interior strengthening rib 65.

In assembling the parts (Figs. 1 and 2), the parts at the lower side of the tube 15 may be assembled in order and the primary carriage 17 with the secondary carriage 18 positioned therein inserted from above to place the lower end of the tube 25 over the upper end of the threaded shank of the screw 30. Then by turning the hand-piece or handle 46, the primary carriage 17 may be drawn down to bring the shoulders 26 into engagement with the spring 27 which tends to eliminate back lash, and then to lower the primary carriage as required against the action of the spring. The cover or cup 23 may then be screwed into the annular flange 24. The screw regulating means for the secondary carriage 18 may be attached to the tube 15 at any time and after the insertion of the primary and secondary carriages, the spring control means at the left of Fig. 2 may be applied.

With this arrangement for independent lateral and vertical adjustment of the sighting reticule and with the telescope accurately locked in immovable relation to the frame of a gun, for example, as disclosed in my copending application Serial No. 195,358, filed May 31, 1927, it is only necessary to have the axis of the telescope reasonably near parallel with the axis of the barrel, the important thing being that the position assumed is substantially the same every time the telescope is removed and replaced.

These conditions being fulfilled and the sight being rigidly in place on the gun, a very fine adjustment for zeroing of the rifle may be had by repeated shots with trial adjustments of the hand-piece 64 until the sights are correct for lateral alignment. Then the screws 62 may be removed and the hand-piece placed in the desired zero position, in which position the vernier arrangement of the screw holes above described will result in having two of the holes in alignment and through these holes the screws 62 may be inserted and screwed home. The rifle being thus permanently zeroed for lateral alignment, any desired subsequent lateral adjustments for windage and drift, may be made by merely rotating the hand-piece 64 one or more notches between teeth 56. These index notches are equally spaced and the pitch of the screw 61 is such that each notch means one-half a minute of angle of lateral adjustment.

The zeroing and adjustment of the rifle for range is accomplished in precisely the same way except the screw 30 and hand-piece 46 are the rotatable elements. In this case, however, each notch corresponds to elevation of one minute of angle.

As a minute of angle subtends one inch per hundred yards of distance, it has been found to be the most convenient unit for sight adjustment and is used in all ballistics. I have therefore made my telescope adjustments for both rang and deflection in minutes of angle. Such adjustment for minutes of angle requires an accurately known focal range of the telescope inasmuch as the distance through which the reticule has to move for each minute of angle is the product of the tangent of one minute by the focal length in inches, which for the particular telescope selected is .000876 of an inch for each minute of angle.

The elevation required up to one thousand yards for most of the high powered cartridges used in this type of gun is less than sixty minutes or one degree. The pitch of the elevating screw 30 is therefore made to give the reticule its maximum movement of sixty minutes in one revolution, that is for this particular telescope the screw is formed with 19 threads to the inch and the ratchet forming part of the screw is cut with 60 notches to provide 60 teeth 34. Therefore the movement of the ratchet member one step to bring the next notch to engagement with the pawl tooth 38 would be one minute of angle and would shift the bullet in its flight to the target one inch per 100 yards of distance. The flange of the dial member or hand-piece 46 is provided with 60 graduations 46^a which correspond to minutes of angle of the line of sight and the hand-piece 46 is properly positioned by bringing a graduation 46^a in alignment with a marking 35^a on member 35. Also figures representing distances in hundreds of yards up to one thousand yards, for any particular cartridge, are placed on the cylindrical part of the hand-piece 46 between the flange containing the graduations 46^a and the finger-lugs at the head of the member 46. After the dial has been graduated to correspond to minutes of angle, such distance figures can be placed on the cylindrical part of the member 46 (Fig. 6) with sufficient accuracy, from the ballistics of well known cartridges without trial shooting. That is if the correct setting of the sight for one trial distance is obtained by trial shooting, the markings for all other ranges may be obtained from knowledge of the ballistics of the cartridge. Furthermore this arrangement and marking permits the substitution of other dials marked with distance indications to correspond with the ballistics of other cartridges whose velocity and weight of bullet differ, without trial shooting for correct adjustment.

Inasmuch as the amount of adjustment required for deflection is less than that for range, and also as it is desirable to have such adjustment as fine as possible, I have made the pitch of the lateral adjustment screw 52 half of that of the range adjustment screw, that is in this particular telescope 38 threads to the inch of the screw 52. The ratchet-forming part of the lateral adjustment screw is cut with 60 notches, providing 60 teeth 56 so that a movement of one notch or tooth corresponds to one-half minute of angle movement of the reticule or one-half inch per 100 yards on the target laterally. Thus one-half of a revolution of the screw in either direction will throw the bullet 15 minutes to the right or left of the target, which is sufficient for adjustment for deflection. The flange of the hand-piece or dial-piece 64 is provided with graduations 64^a at intervals corresponding to half-minute of deflections and figures are placed on the cylindrical part (Fig. 7) so that the number of minutes can be immediately counted up for the desired setting. Also there may be marks to show which way to turn the finger-piece to throw the bullet either to the right or to the left on the target. For example, there may be arrows extending in opposite directions from the zero point and marked L for left and R for right as shown in Fig. 7 to indicate the direction of turning of the handle to shift the direction of the bullet to the right or to the left.

As hereinbefore described, a dial or finger-piece is attached to both the range and the deflection, adjusting screws by two small screws which cut through and into tapped holes that are in circular series in the head of the corresponding ratchet adjustment screw. These holes in the hand-piece and the holes in the ratchet adjustment screws are so spaced that each dial and hand-piece can be rotatably adjusted to bring any one of the graduations corresponding to a minute of

angle of range adjustment screw and one-half minute of angle on the deflection adjustment screw to coincide with the zero line on the corresponding ratchet casing and two of the holes in each dial and hand-piece and two of the tapped holes in the head of the adjustment screw will always match at diametrically opposite points.

It should be understood that the telescope may be secured to the gun by any suitable means, such, for example, as disclosed in my Patent No. 1,656,496, granted January 17, 1928, and my co-pending application Serial No. 195,358, filed May 31, 1927.

I claim:

1. In a sighting telescope, a tube having at an intermediate point a thickened integral portion providing a guideway, a carriage in said guideway, a sighting reticule slidable in said carriage transversely of said guideway, and means for adjusting said carriage including a screw for moving said carriage positively in opposite directions.

2. A sighting telescope including a telescope tube, a sighting reticule therein, and means for adjusting said reticule with respect to the telescope tube, vertically for elevation and transversely for lateral displacement, said means including a screw for moving the reticule positively in opposite directions for one of said adjustments and a screw and restoring spring for effecting the other adjustment of the reticule.

3. A sighting telescope including a telescope tube, a sighting reticule therein, and means for adjusting said reticule with respect to the telescope tube, vertically for elevation and transversely for lateral displacement, said means including a screw for moving the reticule positively in opposite directions for one of said adjustments, and a screw and restoring spring for movement of the reticule for the other adjustment, said screw and spring engaging the reticule through slide surfaces and permitting sliding of the reticule in response to the action of the first-mentioned screw.

4. A sighting telescope including a telescope tube, a sighting reticule in said tube, and means for adjusting said reticule with respect to the tube, vertically for elevation and transversely for lateral displacement, including a screw for positively moving the reticule vertically in opposite directions, a thrust screw and restoring spring for lateral adjustment of the reticule, said thrust screw engaging the reticule through slide surfaces, permitting slide of the reticule in response to action of the vertical screw, and a spring for preventing back-lash in the vertical adjustment.

5. A sighting telescope including a telescope tube, a sighting reticule in said tube, and means for adjusting said reticule with respect to said tube, vertically for elevation and transversely for lateral displacement, said means including a vertical screw for positively moving said reticule in opposite directions, and a transverse screw and restoring spring for adjusting said reticule horizontally, each of said screws having a head rigid therewith and an indexing head for rotating said screw being secured to the screw head in desired zeroed relation by locking screws engaging recesses circularly arranged in vernier relation in said member and head respectively.

6. In a sighting telescope, a telescope tube, a sighting reticule within the tube and means for adjusting said reticule with respect to the tube, said means including a carriage for said reticule slidable in said tube transversely of the axis thereof and having an internally threaded sleeve projecting therefrom, an adjusting screw having a shank threaded into said sleeve and a head, and means fixed to said tube for holding the screw against movement longitudinally of its axis.

7. In a sighting telescope, a telescope tube, a sighting reticule within the tube and means for adjusting said reticule with respect to the tube, said means including a carriage for said reticule slidable in said tube transversely of the axis thereof and having an internally threaded sleeve projecting therefrom, an adjusting screw having a shank threaded into said sleeve and a head, means fixed to said tube for holding the screw against movement longitudinally of its axis, and means including a helical spring on said sleeve to prevent back-lash in shifting said carriage.

8. In a sighting telescope, a telescope tube, a sighting reticule within the tube and means for adjusting said reticule with respect to the tube, said means including a carriage for said reticule slidable in said tube transversely of the axis thereof and having an internally threaded sleeve projecting therefrom, a cup on the tube to receive said sleeve, a helical spring on said sleeve and interposed between said carriage and the bottom of said cup, and a screw having its shank extending through the bottom of said cup into said sleeve and its head engaging the bottom of said cup.

9. In a sighting telescope, a telescope tube, a sighting reticule within the tube and means for adjusting said reticule with respect to the tube, said means including a carriage for said reticule slidable in said tube transversely of the axis thereof and having an internally threaded sleeve projecting therefrom, a cup on the tube to receive said sleeve, a helical spring on said sleeve and interposed between said carriage and the bottom of said cup, and a screw having its shank extending through the bottom of said cup into said sleeve and its head engaging the bottom of said cup, said screw head having a sleeve portion fitting over said cup and having at its inner end an outstanding flange, and a member attached

to said tube engaging said flange at its outer face to hold the head of the screw against the cup.

10. A sighting telescope including a telescope tube, a sighting reticule therein, and means for adjusting said reticule with respect to the telescope tube, vertically for elevation and transversely for windage or drift, said means including a primary carriage slidable transversely of said tube, a secondary carriage carrying said reticule and slidable in said primary carriage transversely of the movement thereof, a screw for moving the primary carriage positively in both directions for one of said adjustments and a screw and restoring spring for effecting the other adjustment of the reticule.

11. A sighting telescope having a sighting reticule within the telescope tube and means for adjusting said reticule with respect to the tube, said means including a carriage for said reticule slidable in said tube transversely of the axis thereof and having a threaded member projecting therefrom, an adjusting member having a projection threaded to fit said threaded member and a head, and means carried by the tube for holding said adjusting member against movement longitudinally of its axis.

12. A sighting telescope having a sighting reticule within the telescope tube and means for adjusting said reticule with respect to the tube, said means including a carriage for said reticule slidable in said tube transversely of the axis thereof and having a threaded portion, a cup on the tube in alignment with said threaded portion of the carriage, a helical spring in said cup and interposed between said carriage and the bottom of the cup, and an adjusting member having a threaded connection through the bottom of said cup with the threaded portion of said carriage and a head engaging the bottom of said cup.

13. A sighting telescope including a telescope tube, a sighting reticule therein, and means for adjusting said reticule with respect to the telescope tube, vertically for elevation and transversely for lateral displacement, said means including a carriage with respect to which said reticule is fixed, a main carriage slidable in said tube transversely of its axis and in which the first mentioned carriage is slidable, means for moving said main carriage in opposite directions for one of said adjustments, and a screw and restoring spring for adjustment of the reticule in the other direction, said screw and spring engaging the first-mentioned or reticule carriage through slide surfaces and permitting sliding of the reticule in response to the movement of the main carriage, a member on said tube having a head with a cup-headed portion to receive the head of the screw and having a recess at one side, and detent means for said screw including a spring-pressed pawl in said recess and a set of teeth on the screw head to cooperate with said pawl, the teeth being of sufficient length to permit longitudinal movement of the screw without disengagement of said teeth and pawl.

14. A sighting telescope including a telescope tube, a sighting reticule therein, and means for adjusting said reticule with respect to the telescope tube, vertically for elevation or range and transversely for lateral displacement, said means including means for moving the reticule vertically in opposite directions including a screw of such pitch as to shift the direction of the line of sight sixty minutes of angle for one complete revolution, means to detain said screw in any one of sixty positions at equal angular intervals completely around the axis of the screw, means for effecting transverse adjustment of the reticule, and a hand-piece detachably connected with said screw and having graduations thereon to cooperate with a fixed graduation to indicate the amount of rotation of the screw and consequently the change in minutes of angle of the line of sight

15. A sighting telescope including a telescope tube, a sighting reticule therein, and means for adjusting said reticule with respect to the telescope tube, vertically for elevation or range and transversely for windage or drift, said adjusting means including means for positively moving the reticule vertically in opposite directions, and means for moving said reticule transversely including a screw of such pitch as to shift the line of sight thirty minutes of angle for each revolution, means to detain said screw in any one of sixty positions at equal angular intervals completely around the axis of the screw, a hand-piece detachably connected with said screw and having graduations thereon to cooperate with a fixed graduation to indicate in minutes and half-minutes of angle the amount of shifting of the line of sight and markings to indicate the direction of turning to adjust or deflection to one side or the other.

16. A sighting telescope including a sighting reticule therein, and means for adjusting said reticule with respect to the telescope tube, vertically for elevation or range and transversely for windage or drift, said reticule-adjusting means including means for moving the reticule vertically in opposite directions and including a screw of such pitch as to shift the direction of the line of sight sixty minutes of angle for one complete revolution, means to detain said screw in adjusted position, means for effecting transverse adjustment of the reticule, a fixed marking to correspond with the zeroed position of the screw, a hand-piece for attachment to said screw and having graduations to cooperate with said fixed graduation to indicate the change in minutes of angle of the line of sight, and means for

attaching said hand-piece to said screw to enable fine angular adjustment of said hand-piece with reference to the screw to bring the zero of the minute-indicating graduations on the screw into alignment with the fixed graduation when the screw is in zeroed position.

17. A sighting telescope having a sighting reticule within the telescope tube and means for adjusting said reticule with respect to the telescope, said means including a screw having an exterior head rigid therewith and provided with a circumferential series of detent teeth, a spring pressed detent pawl on the telescope for engaging said teeth, and a supplemental indexing member secured to said head, said indexing member being positively locked to said head at desired zeroed relation by two sets of circularly arranged recesses in vernier relation, in said member and head respectively, so that two diametrically opposite recesses of each series are in approximate registry in all angular positions, and a screw engaging each pair of registering recesses and clamping said member and said head in fixed relation.

18. In a sighting telescope, a telescope tube, a sighting reticule in said tube, and means for adjusting said reticule vertically and horizontally including a horizontal transverse screw of such pitch as to adjust the line of sight thirty degrees of angle for each revolution, and a hand piece for rotating said screw and being provided with markings to indicate in minutes and half-minutes of angle the amount of angular adjustment of the line of sight and also with markings to indicate the direction of turning to adjust for deflection to one side or the other.

19. In a sighting telescope adapted for rigid attachment to a gun, a telescope tube, a sighting reticule within the tube and means for adjusting said reticule with respect to the telescope vertically for elevation or range and transversely for windage or drift, including a vertical screw of such pitch as to adjust the line of sight to the extent of sixty minutes of angle for one complete revolution, and a hand-piece detachably connected with said screw and provided with graduations to co-operate with a fixed graduation to indicate the extent of rotation of the screw and consequently the adjustment of the line of sight in minutes of angle and also with markings determined by the well known ballistics of a selected cartridge to indicate the ranges to which the different settings correspond.

20. A sighting telescope including a telescope tube, movable sighting means therein, a screw for zeroizing and for range adjustment of said sighting means, detent means acting on the head of the screw, a screw-operating indicator member attached to the head of said screw and constituting one of a set of interchangeable members, each having a range scale determined by the well known ballistics of a cartridge and adapted to co-operate with a fixed index, and means for rigidly securing said indicator member to the head of said screw in different positions of angular adjustment to enable it to be shifted to and secured at zero indication, after the zeroing adjustment, without shifting the screw.

Signed at New York city, in the county of New York and State of New York, this 27th day of May, A. D. 1927.

RALPH G. PACKARD, JR.

March 5, 1929. R. G. PACKARD, JR 1,704,060

DETACHABLE SIGHT FOR RIFLES

Filed May 31, 1927 3 Sheets-Sheet 1

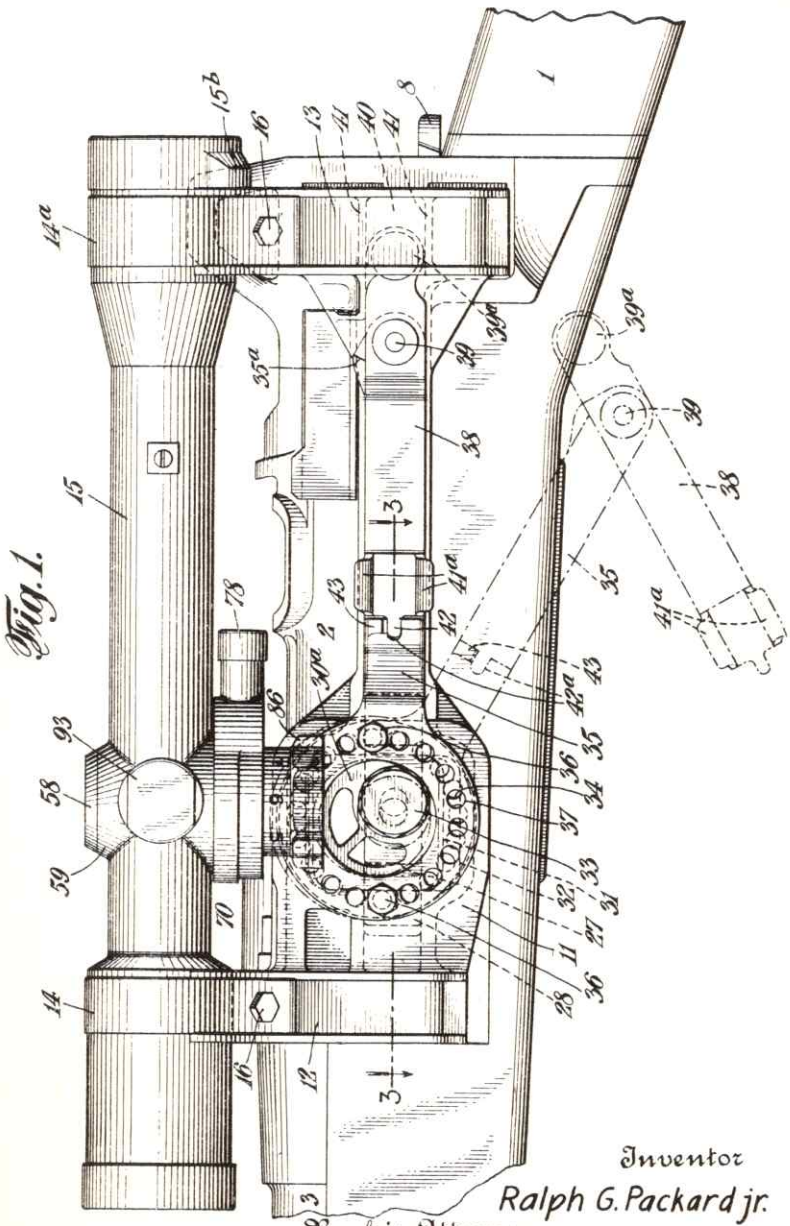


Fig. 1.

Inventor
Ralph G. Packard jr.
By his Attorney
George Mace

March 5, 1929. R. G. PACKARD, JR 1,704,060

DETACHABLE SIGHT FOR RIFLES

Filed May 31, 1927 3 Sheets-Sheet 2

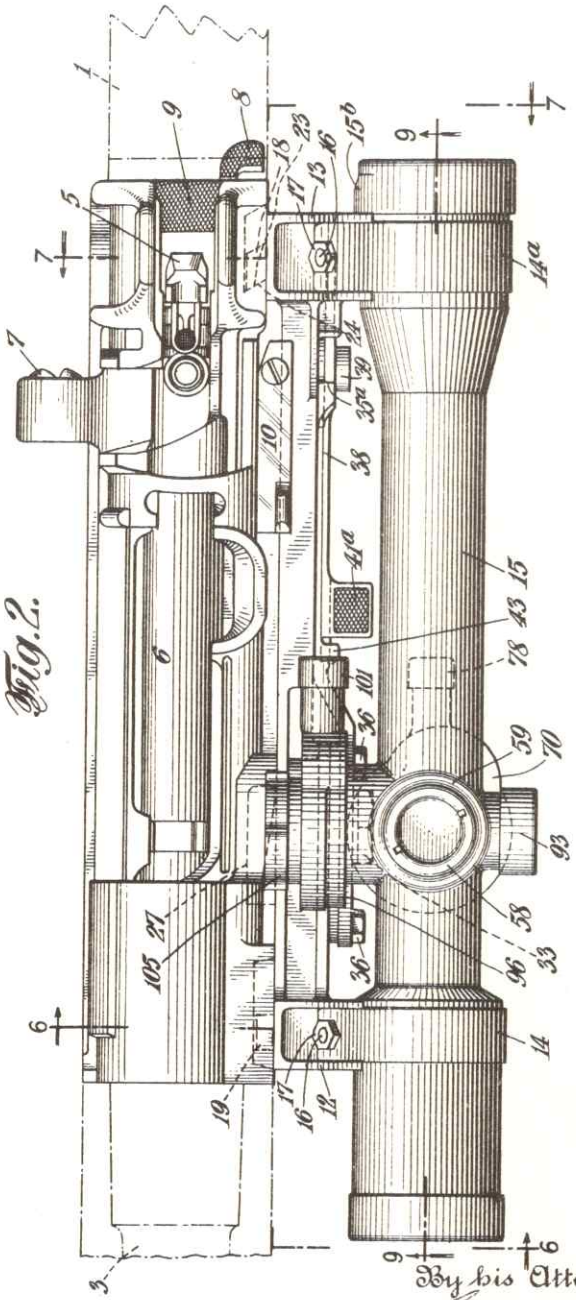


Fig. 2.

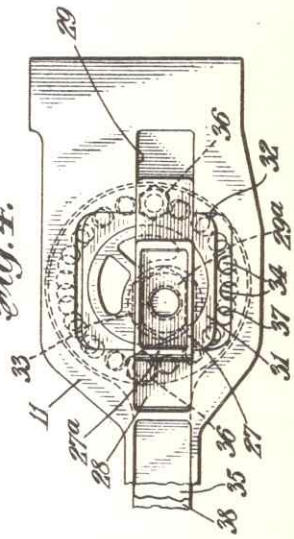


Fig. 4.

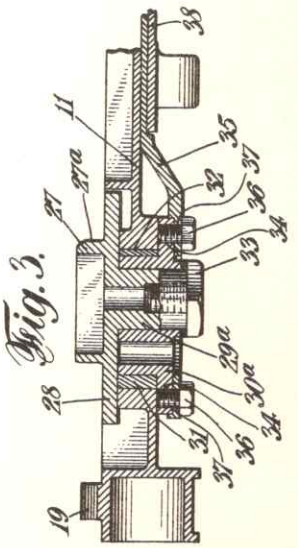
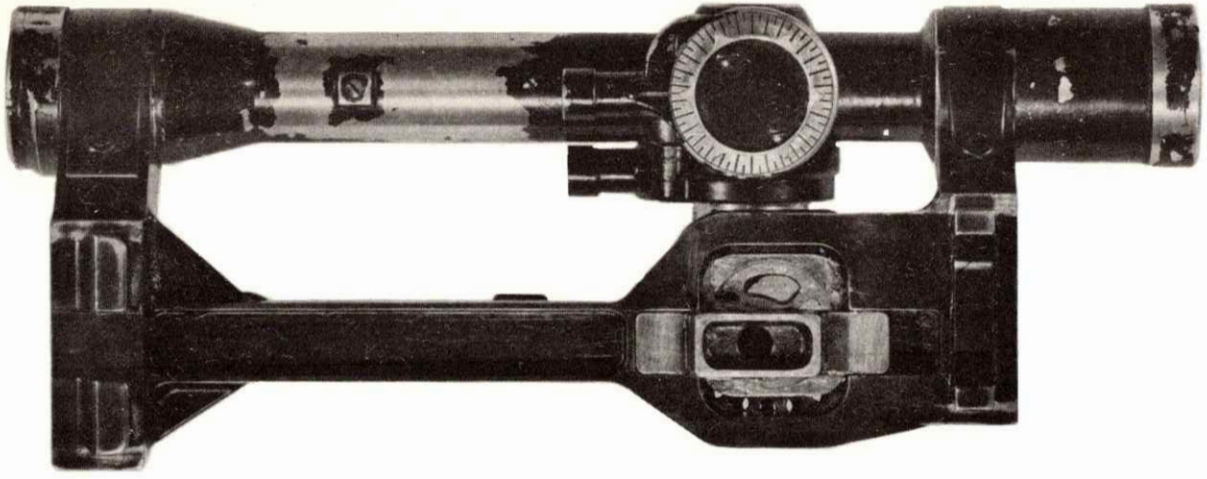


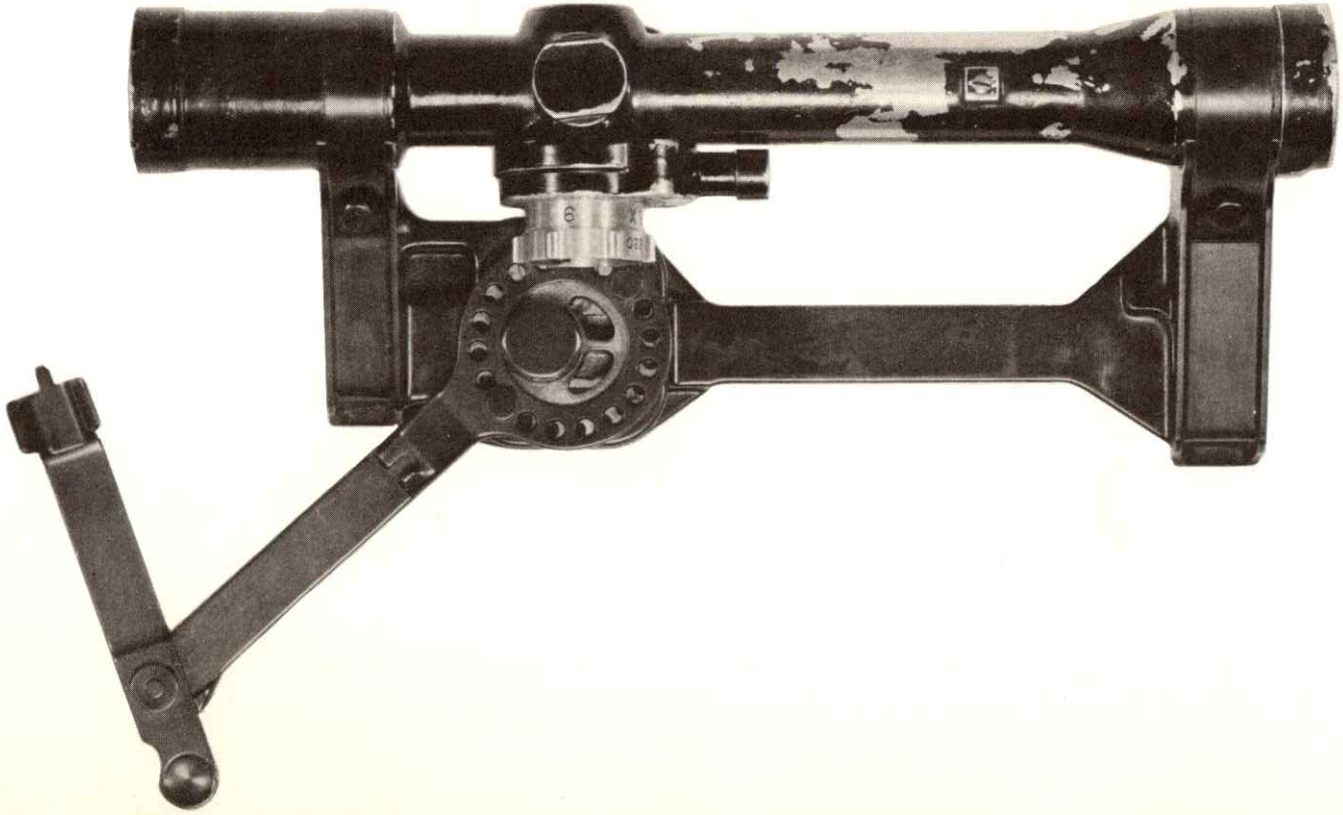
Fig. 3.

Inventor
Ralph G. Packard jr.

By his Attorney
George C. Dean



RIGHT SIDE OF TELESCOPE AND MOUNTING showing dovetail lugs for locking it to the receiver and the eccentric cam for pushing the telescope mount into place; also, the dial for the deflection adjustment graduated in minute and half minute of angle.



LEFT SIDE OF TELESCOPE SHOWING TOGGLE JOINT LEVER OPEN IN THE POSITION NECESSARY TO ATTACH THE TELESCOPE TO THE RECEIVER

From my experience in the use of telescope sights while hunting, my general specifications would be as follows:

The sights should have internal adjustment to get rid of all adjustment and joints in the mount. The magnifying power should be somewhere between two and a half and three. I have found that four power on running shots was too high for me, and I could do better with a two and one half magnification. The exit pupil should be between six and seven millimeters in diameter, and the width of the field of view about thirty-five feet per one hundred yards. The adjustment dials for range and deflection should be covered by tight screw caps to keep out all dampness and dust from the interior of the telescope tube. No adjustment for range or deflection should ever be made in the hunting field, but the telescope sight zeroed and set at a medium range of say two hundred yards, and with the modern cartridge and its flat trajectory, it will cover all the practical shooting distances in hunting. If the telescope sight is a detachable one it should be mounted as low as possible to clear the open sights, in fact, so low that when the telescope sight is attached to the gun, the open sights could not be used. A telescope sight in this position shows up the front open sight, of course, but as long as this shows only in the bottom part of the view through the telescope and it is only a blur, I do not consider it important. The great faults of commercial telescope sight mounts are the lack of size of attachment of the telescope to the receiver; also, in all of the commercial telescope mounts that I know of, neither the dovetail nor the piece attached to the receiver into which the dovetail slides are hardened. These sights of the usual type in which the bearing for the dovetail is screwed and pinned to the left side of the receiver, and the dovetail attached to the telescope slides into it, do not retain their accuracy. I believe the best way to obviate this trouble would be to induce the makers of commercial rifles to put out a special receiver with milled out pockets to take a dovetail attachment which would give sufficient size of base to the mount attached to the telescope to insure continued accuracy.

I believe in a single sighting post for the reticule without crosswires. This sighting post should be as thin as possible, with a tapering top and a very narrow flat on the top of it. I have found by experiment that it is not possible to make a sighting post less than eight-thousandths of an inch in width. This is really too wide. In collaboration with Doctor Kollmorgen Optical Company, we got up a telescope reticule which I think is much better, and will be described further along in connection with the description of another rifle.

CHAPTER IV

ELEPHANT RIFLES

At the beginning of 1928, I decided to go to British East Africa on a hunting trip. I bought a Mauser Action Rifle taking the 404 Jefferies cartridge, fitted with number 48 Lyman Sight from Griffin and Howe. Also, I took with me my 30-06 thumb-trigger with the detachable telescope sight just described. I stopped off at London for about three weeks, and while there bought a double 470 Wesley-Richards with a single trigger and open notched sights. My trip underway, I hunted for about seven months, mostly in Tanganyika, and shot the usual line of game, killing elephant, rhino, hippo, buffaloes, lion, and some of the different varieties of antelope.

I did not like the 404 and soon gave it away, and I did not care for the double 470, principally because it did not have peep sights to which I have been accustomed for so long, and also because I did not consider it accurate. Another bad fault of this gun was its single trigger which got to doubling on me. When I returned home, I attempted to have this doubling eradicated, but was unsuccessful. It would go along for ten or a dozen shots and then double again.

I thought some improvements could be made on this

rifle. I had a new top lever that locks the barrel to the frame made U-shape to go around the peep sight which was screwed fast to the tang of the frame in the rear of the breech opening, and cut off the fixed leaf of the open sight. At the same time I had the automatic feature of the safety eradicated. This was a very good sight and I tried the gun out very carefully for accuracy with the peep sight. I found the best I could do at a hundred yards, shooting alternate barrels, was to make about a four inch group at eight o'clock with the right hand barrel, and the same size group at two o'clock with the left hand barrel. It took a circle nine inches in diameter to enclose these two groups, which did not please me and I lost all respect for the gun and gave it away.

On this hunting trip in Tanganyika, I became very much interested in hunting elephant. However, I learned that the license system in the British East African Colonies allowed only two elephants in each of the three colonies of Kenya, Tanganyika, and Uganda; but, that in the Belgian Congo, one could get a license for two elephants at five thousand Belgian Francs, and that the Belgian authorities would sell you all the licenses you wanted to pay for. Therefore, I decided to go there on the next trip.

In preparation for this trip I had made a special big-game rifle. I selected the 416 Rigby cartridge, and used the Mauser Magnum action, the magazine holding four cartridges. I imported the action from Germany and had the gun put together here. I had made a specially designed bolt sleeve which carried the peep sights between side protecting wings, somewhat like the sight protection on the Model 17 Enfield. A safety was also incorporated in this bolt sleeve, which was a small lever on its right hand side and took the safety off by a downward pressure of the thumb in a movement of ninety degrees, and put on in the reverse motion, which locked both the firing pin and the bolt from rotating. This safety is entirely hand dismountable.

The peep sights on the bolt sleeve had two apertures, one of three thirty-second diameter for ordinary light, and the other aperture of five-sixteenths for twilight or very poor light. The rear sight could be

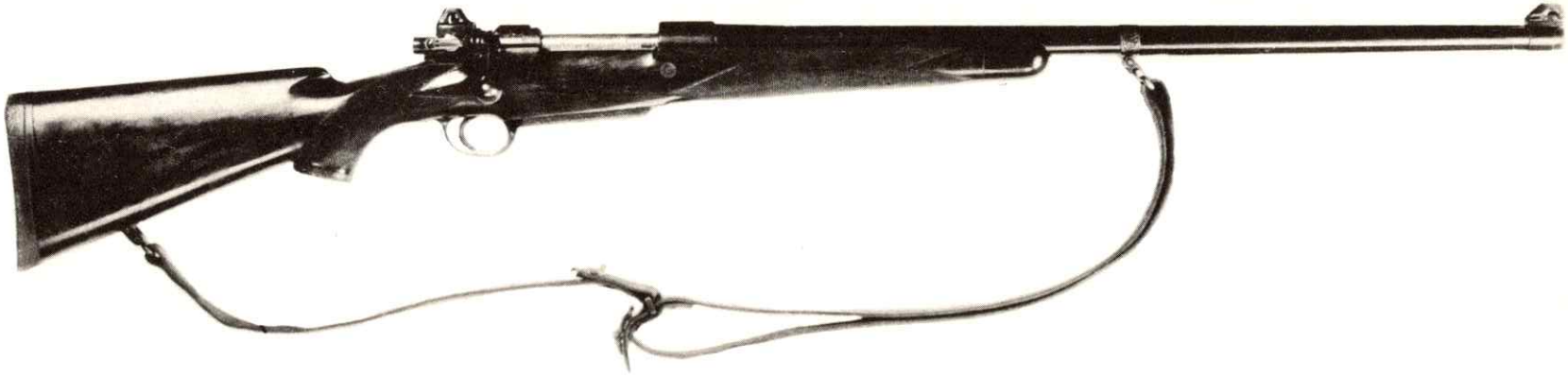
adjusted horizontally for zeroing but not for range. The sights were set for one hundred yards and this setting was obtained by filing down the front sight and shooting until the required height was reached.

The front sights were placed between two wings on the front end of the barrel, similar to the sight protection on the Model 17 Enfield. There was a fixed Lyman front-sight blade with a three thirty-second ivory bead, the front sight being easily removed and held in place by a through screw. In a pocket of the pistol grip cap were two other front sight blades. All of these sight blades had a difference of thirty-thousandths of an inch in height, so that if I thought necessary I could change the height of the front sight a little. This change in height might be necessary due to old ammunition or some other reason. The fixed three-thirty-second diameter bead front sight was, of course, always used with the three-thirty-second aperture rear peep sight. In front of this fixed front sight there was pivoted a large bead sight of about three-sixteenths in diameter which could be rocked up in front of the fixed foresight and used with a large aperture of the peep sight on the bolt sleeve. This gun weighed, without the sling, ten pounds, two ounces.

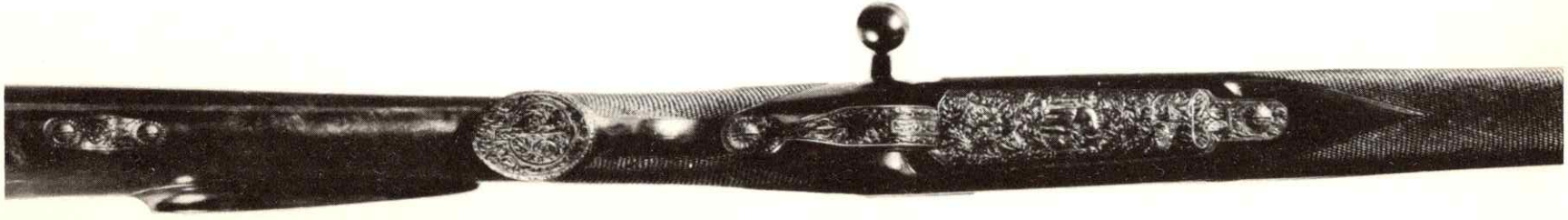
I fired this rifle about one hundred and fifty times here before going to Africa as I wanted to get thoroughly familiar with it.

The cartridges used were obtained in New York and worked all right. The accuracy was very good for this type of gun. I could make four and five inch groups with it at one hundred yards. I had ordered some new cartridges direct from Rigby which were sent to me at Nairobi. These cartridges were put up in soldered tins, packets of ten. When I began hunting with the gun in Belgian Congo, I found some of these cartridges so large that I could not close the bolt on them. I had to make a general practice of running a sufficient number of cartridges for the day's hunt through the gun, rejecting those that were too large. The rejection of these cartridges in the whole lot averaged about ten per cent.

This rifle proved most satisfactory in every way and to my mind is very much superior to any of the English high-class double rifles. I killed a great amount



RIGHTHAND VIEW OF RIFLE which I designed for use in Africa, taking the 416 Rigby Cartridge



BOTTOM VIEW OF 416 RIGBY-MAUSER. I had the hole in the trigger guard for the trigger filled up with the metal so as to bring the trigger back far enough to almost disengage with the sear, then, as shown by this print, there is a hole cut through the bottom of the trigger guard through which you can run a small flat file, filing away sufficient metal where the trigger rests against the trigger guard plate, thus allowing the trigger to go further forward and get a larger grip on the sear. This method of trigger pull adjustment seemed to work very well.

DRAWING SHOWING BOLT SLEEVE, PEEP SIGHT, AND SAFETY.

Fig.1.

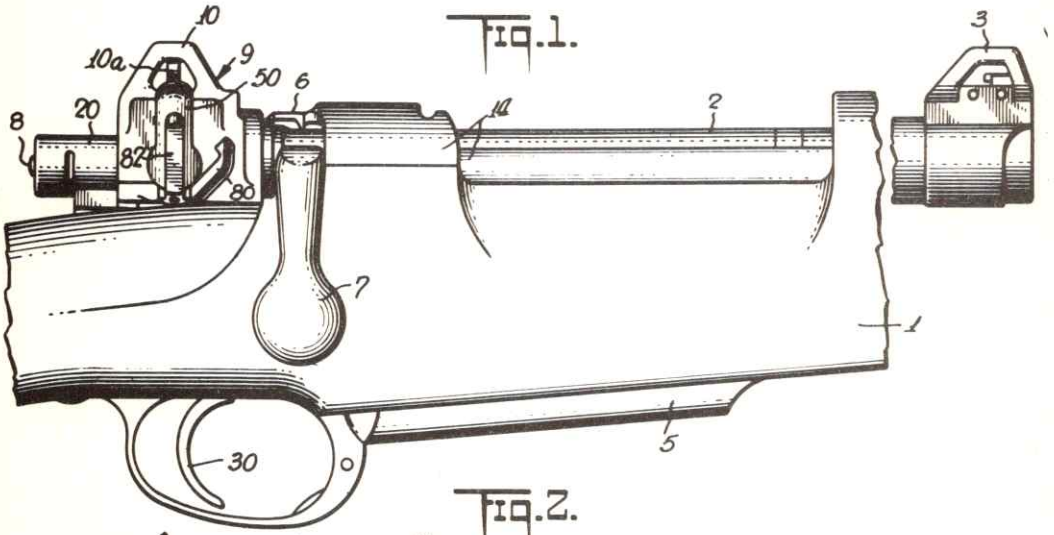


Fig.2.

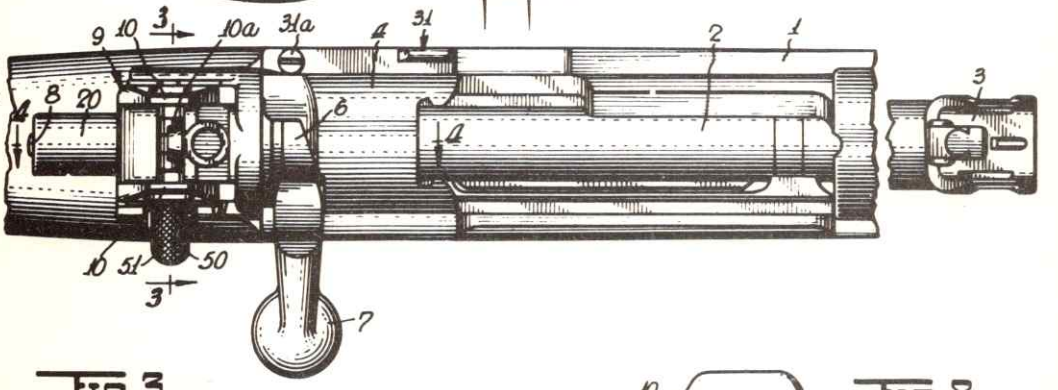


Fig.3.

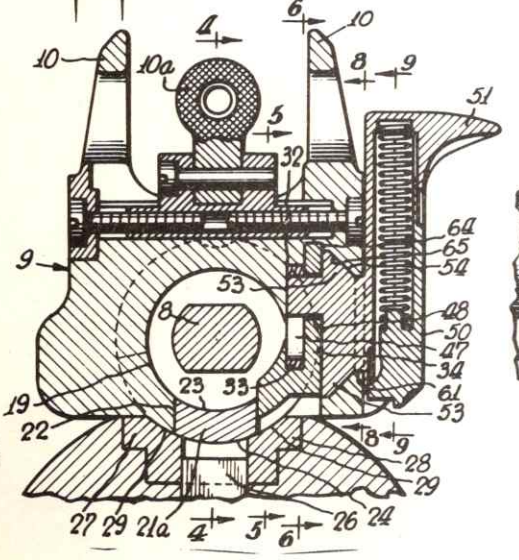
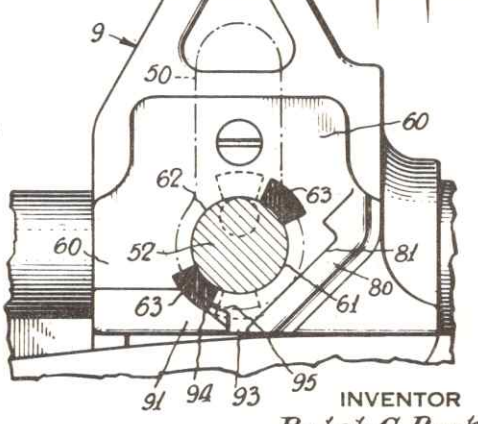


Fig.8.



INVENTOR
Ralph G. Packard
BY
ATTORNEY

DRAWING SHOWING BOLT SLEEVE, PEEP SIGHT, AND SAFETY

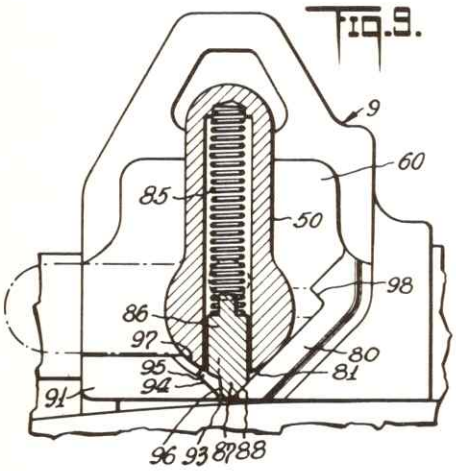


FIG. 9.

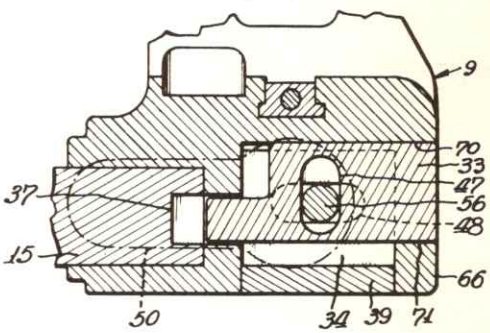


FIG. 11.

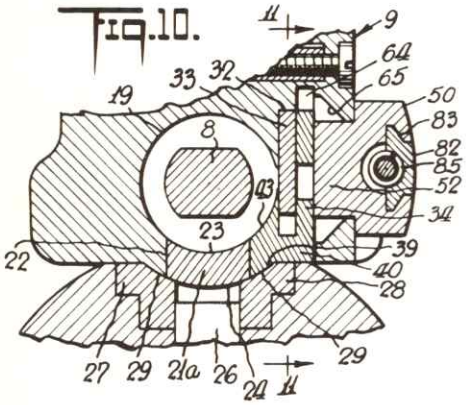


FIG. 10.

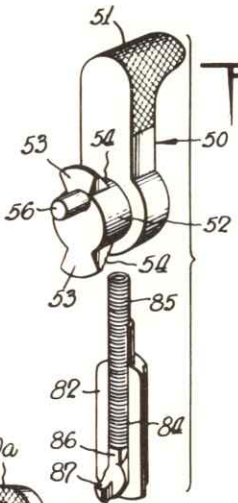


FIG. 13.

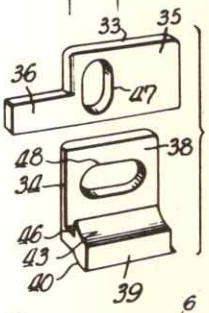


FIG. 14.

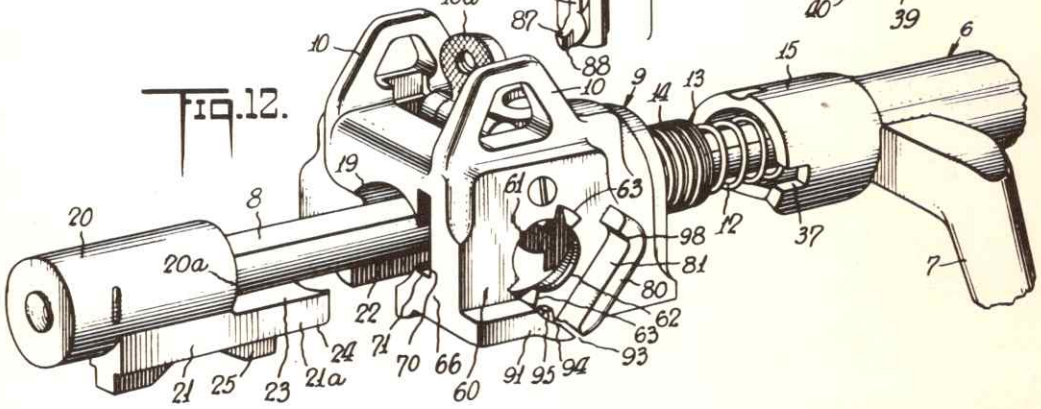


FIG. 12.

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BY
Gerald C. Rhead
ATTORNEY

of game with this gun, including elephant, buffalo, rhino, hippo, lion, and the various breeds of antelopes.

Because of the cartridge being longer than the Springfield 30-06, this rifle had a longer stroke of the bolt for loading and extraction. I was so accustomed to operating the bolt of the rifle with the Springfield length of cartridge that I would not automatically retract the bolt far back enough and had to train myself by operating the rifle to this longer stroke of the bolt. After sufficient practice I could operate this rifle with its longer bolt stroke nearly as rapidly as the Springfield without taking the rifle down from the shoulder.

I always used solid hard point bullets, even on lions, as I do not believe in the soft points on large animals. The best bullet that I have found for the 30-06 Springfield cartridge is the 220 grain delayed mushroom made by the Remington Company. I have used this cartridge extensively in the Yukon territory and Africa, and believe that penetration and being able to go through bone is more important than the shock due to the bullet breaking up in pieces.

On this trip I hunted most of the time in northern Belgian Congo, and used the 416 almost exclusively. I spent two or three months in the territory of a chief called Dicka. He supplied me with porters and did everything he could to make his subjects help me to find good elephants: Dicka had a small army of several hundred men, armed with muzzle loaders which had originally been flintlock European army muskets, and had been altered to percussion. This had been done in the usual cheap way by changing the hammer, taking off the priming pan, and screwing in a small cylinder to which was attached the nipple for the percussion cap.

It happened that I suffered a sprained ankle and was laid up at Dicka's main village for a couple weeks. As I had nothing to do, and a great many of Dicka's muzzle loaders were in bad repair and practically useless, I went to work repairing them. The white motor mechanic with me was a very good workman and I had a fine lot of hand tools. Dicka had about six iron workers of his own, a fair assortment of hand tools, and a native bow lathe. We were able to make and put in new

nipples; retemper main springs; and cut new notches in the tumblers; in fact, we repaired a large number of these old guns.

One curious incident happened in this gun repair. Dicka had a 9.3 Mauser, and he had sent one of his hunters out to kill a buffalo with this gun about a week before I reached his village. The buffalo and hunter were found together - dead. The rifle was brought to me for inspection and whatever I could do about it. The gun had evidently been fired with some obstruction in the muzzle. The barrel was split for about three inches, and the ramp with its front sight blown off. The rear sight was gone. I had the barrel sawed off, a new front sight soldered on, and a new rear sight made; then I bore sighted it and adjusted the sights at fifty yards. As Dicka had only twelve cartridges and could not obtain any more, I fired one test shot at fifty yards and found it, as I thought, accurate enough. Several days later I met Dicka's hunter with the rifle. He had been sent out to shoot a buffalo for meat. On looking over the rifle, I noted that my new rear sight had been knocked out of the gun, and when I asked the hunter about it he informed me that a rear sight was no good and should not be on a gun because it obscured the view of the front sight, so he had removed it.

I found these natives could make a percussion cap themselves. They made a die by drilling a hole into a piece of iron, then took a small piece of tin can, driving it into the die, thus forming the outside shell of the cap. The natives could obtain parlor matches which, as you know, will ignite by percussion. They procured the matches at some of the trading posts attached to the military stations. To make the cap after the outside metal form had been made, they put the head of one or two parlor matches in it and sprinkled a few grains of loose powder into the cap, and it appeared to work quite well. The bullets for these muzzle loading guns were made from native iron, roughly hammered round.

At one time through Central Africa the natives made a very good quality of iron right from the ore, and from this they manufactured their spear and arrow heads, knives, hoes, and axes; as well as all metal implements they needed. This art of making iron directly

from the ore has practically become extinct, except in isolated districts where they have little contact with civilization. In the district ruled by Dicka, the natives were still making their own iron. I had Dicka send a group of these men into my camp where they dug the ore, made the charcoal, made their furnace, smelted the iron and drew it out into bars from which they made me some knives. I found they could make a thin knife of fairly good quality, practically as good as steel, by consolidating the metal in the blade with a great amount of cold hammering.

CHAPTER V

MODEL 1938 RIFLE AND SIGHT

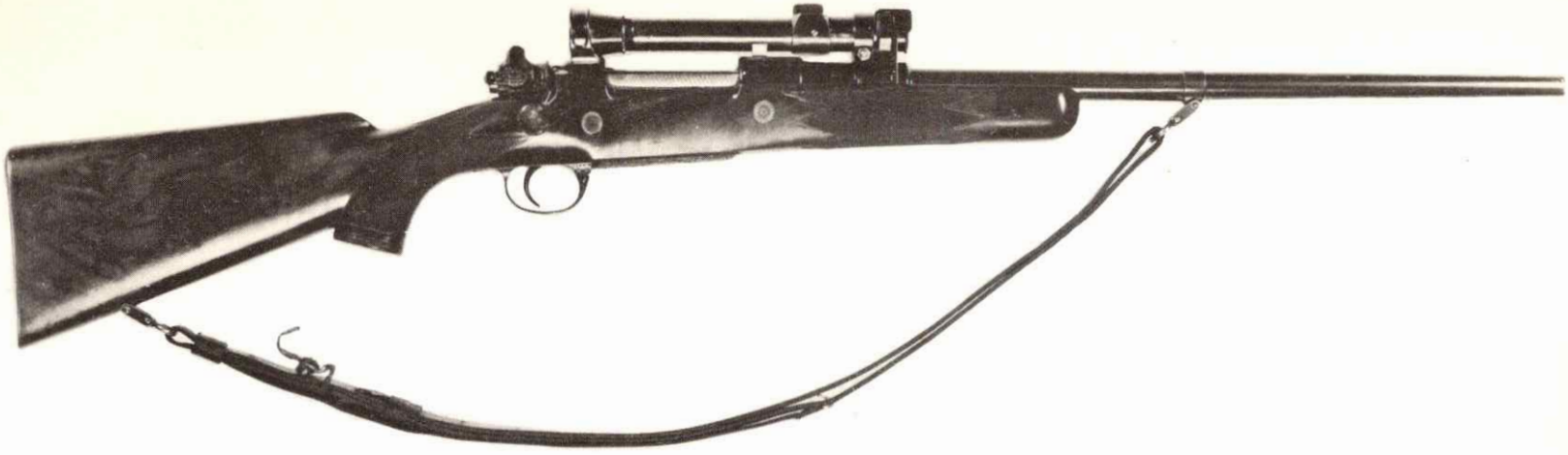
The next rifle I got up was a Mauser action telescope sighted, taking the 30-06 Springfield cartridge. I had this rifle made up for my friend Harold Lokken of Yukon Territory, in an attempt to prove that the telescope sight was all the sight necessary without any metallic sights under all conditions of weather and temperature. Lokken used this rifle for two years under all kinds of weather conditions, including rain, snow, and sometimes in a temperature of as much as fifty below zero. He informed me that he had never had any difficulty in using this telescope sight under these conditions, and he considered it the best hunting rifle he had ever used. He shot a large number of caribou, moose, and bear with this rifle.

The receiver is a Mauser action. The telescope mounts are of the rigid bridge type. The safety is incorporated in the bolt sleeve and takes off by depressing with the thumb a small lever on the right-hand side of the bolt sleeve. This motion in taking off the safety is similar to cocking the old-fashioned hammer gun. The safety is put on using the reverse motion, and it is entirely hand dismountable, and similar to the bolt sleeve and safety previously described in the

rifle taking the 416 Rigby Cartridge with the exception that it has no sight on it.

The rear mount is secured to the bridge of the receiver by a horseshoe shaped dovetail and a cross taper key. The forward mount which is just in front of the receiver is a sleeve which goes on the barrel and is held by a lock nut and two small set screws. The telescope is dropped in between the projections of the forward mount and then is shoved to the rear, enters, and is held by the rear ring mount. When it is in place, a half round saddle is put over the top of the telescope tube on the forward mount. The rear end of this saddle butts up against the projections on the telescope tube containing the internal adjustments, and the forward end of the saddle butts up against the rear end of the forward mount. When the saddle is in place, a band goes around both the telescope tube and the saddle clamping the whole hard together with a quarter inch through bolt. The knob on the bolt handle is made into a wrench so the bolt handle can be used as a spanner to take out the bolt holding the telescope clamp. In this way you can change telescopes without any extra tools. To make the telescope tube somewhat stronger and more rigid, a small piece of aluminum was fastened to the underneath side of the telescope tube resting in exact fit on the top of the receiver ring. I furnished two telescope sights with this rifle and found the telescope tubes were not round so I had both of them ground to enter the rear mount with a close push fit so they could be interchanged. On account of the telescope being in such a low position, I had to cut away some of the rear part of the receiver on the right-hand side to allow the cartridges to eject and load easily. This cutting away of the receiver required that I make a new extractor longer than the old one to keep the rear end of the extractor in the bolt lug groove. The telescope sight mounts and the bolt sleeve with its attached safety are my own design.

In 1936 I finished a new design for a bolt-action rifle taking the 30-06 Springfield cartridge. The two main objects I endeavored to accomplish in this design were: First, to get a telescope sight in the best position for the eye, and for supporting the head on the



RIGHT SIDE OF RIFLE

TOP OF RIFLE

stock; also, the scope itself to be absolutely rigid, with no chance of its ever getting out of adjustment, and of such rugged construction that it would withstand ordinary usage on a hard hunting trip, - so rugged, in fact, that the whole outfit could be carried in a scabbard on horseback and require no more care than the ordinary old-fashioned rifle with open sights. Second, to shorten the length of the bolt travel to not more than the length of the cartridge, and still retain the locking lugs on the forward end of the bolt. With these two features rigidly held to, the design naturally worked itself out in its present form.

The receiver and the tube for the telescope are in one piece; that is, they were milled out of a solid block of nickel steel. The telescope has internal adjustments for both elevation and windage, these adjustments being practically only for zeroing. The adjustments are by one-quarter minute of angle. The openings through which adjustments are made are covered with damp and dust-proof screw-caps which can be taken off and screwed up by means of a hexagon socket in the knob of the bolt handle.

Because of shortening the bolt travel, while retaining the locking lugs at the forward end in the same position as in the Mauser and Springfield, the cartridges, in feeding from the magazine, have to come into the path of the bolt at an angle of about forty-five (45) degrees from the vertical on the left-hand side of the receiver. This is about the position in which the cartridges meet the bolt in the old Krag.

Because of the telescope tube being very low on the receiver, an underneath detachable magazine was necessary, and also side ejection to the right. The magazine is of circular cross section, the same as the forearm, and forms a continuation of the forearm to the rear, and so arranged that there would be no projecting of the magazine as on the Winchester Model 1895, and the Lee-Enfield. It holds seven cartridges. The magazine is of the rotary type, somewhat similar to the Mannlicher-Schoenheuer, and has a small cylinder to which is affixed an arm, all in one piece. This cylinder contains a spiral spring which is compressed as the cartridges are put into the magazine. The arm attached

to the cylinder shoves the cartridges up to the left side of the magazine, where they come into the path of the bolt. The cartridges are retained in the magazine by the edge of the magazine being crimped over towards the center a little, and by a pivoted lip which is held in place by the coiled spring which also feeds the cartridges into position for loading. As the cartridge is shoved forward by the bolt this pivoted lip, or you might say cartridge retainer, allows the forward end of the cartridge to swing sufficiently to the right to enter the chamber of the barrel.

The magazine is held rigidly in the receiver at both ends. There is a notch latch at the rear end, and a rod going through the rotating cylinder and its spiral spring, into a hole in the receiver at the forward end of the magazine. This rod has a hook on its rear end, and is positively retracted by the magazine catch when it is released. The magazine catch release lever looks like a second trigger, and is immediately forward of the real trigger, but within a separate guard. The catch has a spiral spring that forces it into place, together with the through-rod, but the action of this magazine catch is positive and it can be worked if the spring should become inoperative. There is absolutely no chance of the magazine getting stuck so that it cannot be instantly removed.

This rifle is a take-down; that is, the butt stock can be taken off of the receiver. There is a stock bolt that goes lengthwise through the butt stock, with a T-shaped head and a nut at the rear end that tightens down into a pocket in the butt plate. The stock has a ferrule on the front end which fits into a socket in the receiver. As the socket and ferrule are not round there is no chance of the stock turning. The T-head of the stock bolt goes into a socket behind lugs in the receiver, and the nut in the butt plate can be tightened up by using as a wrench the hexagon socket in the knob of the bolt handle. The nut in the butt plate is locked by means of a small spring catch which can be easily thrown out of engagement by using the point of a knife or of a bullet. I have used this design of take-down on several other guns, and have found it very satisfactory.

The bolt has the usual front locking lugs as in the Mauser and Springfield. It has two safety lugs near the rear end behind the end of the extractor. The bolt handle is bent back far enough to bring it about in line with the trigger, and is then bent out. It is practically of the same shape as that of the 30-S Remington and 1917 Enfield Rifles. Instead of the usual bolt sleeve for retaining the mainspring and firing pin in the bolt, there is a short sleeve through which the firing pin passes. On the side of this sleeve is a lug which can be pushed into an undercut pocket in the lower side of the bolt handle, the mainspring keeping this lug sleeve always in place. By getting rid of the bolt sleeve in this way I am able to get two diametrically opposite cocking cams; thus in cocking, the cocking piece is forced straight back with no tendency to cant. I have used this bolt design on two other rifles, and I think it is far superior to the usual one.

The cocking piece is held to the firing pin by a small sleeve nut, with notches around its rear end to take a spring catch in the side of the cocking piece. This spring catch can be depressed with the point of a bullet, and the nut revolved, releasing the firing pin. The notches on the sleeve nut are so spaced that changing from one notch to the next advances or retracts the firing pin by .007 inch. I think this is a good detail, as it enables the protrusion of the firing pin from the face of the bolt to be adjusted as desired.

The ejector is placed in the left-hand forward lug of the bolt, and rotates with it. As the bolt is retracted to eject a fired cartridge and reload, the end of the ejector strikes the bolt stop, which drives it forward and throws out the empty shell at the right side of the gun. The ejector is in a semi-circular slit in the forward end of the bolt lug, and is held in place by a small pin. There is no strain on this pin from the ejector, and it is used just for holding the ejector in place in the bolt. As the slit for the ejector goes only about half way through the length of the bolt lug, it does not appreciably weaken the lug. Therefore, one lug is practically as strong as the other, which is not the case with the Springfield and Mauser designs, in which one lug is cut through its entire length to

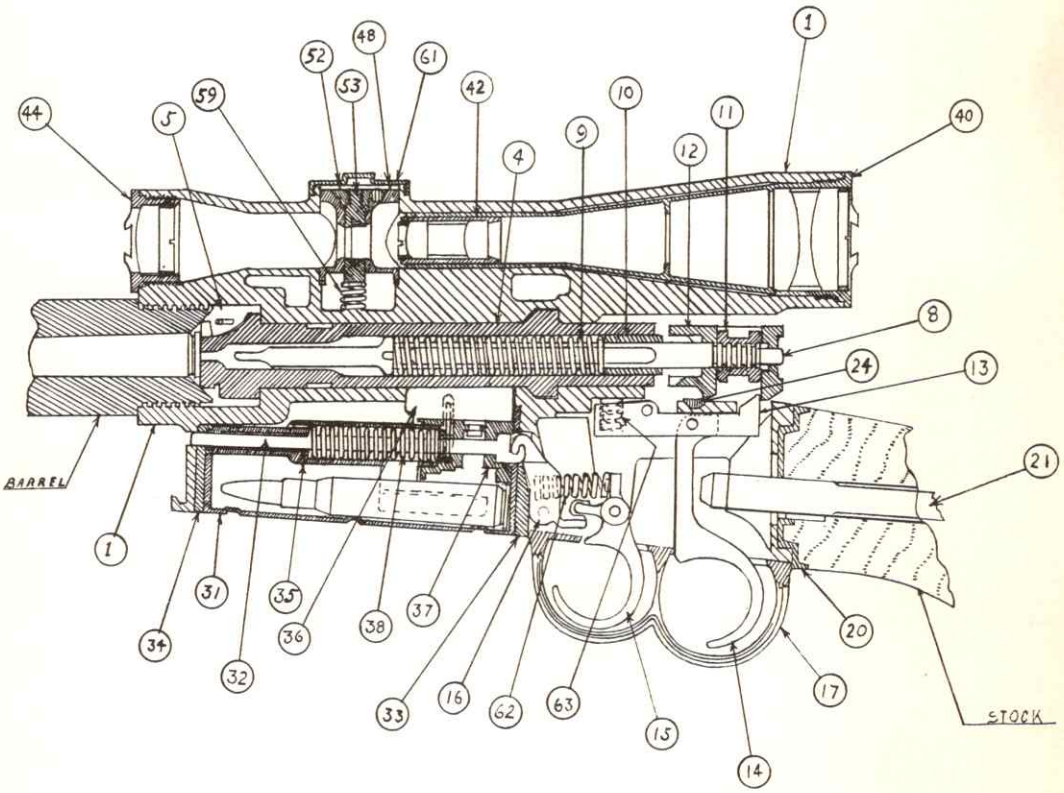
receive the ejector.

The travel of the cocking piece is less than usual in this type of rifle, and is apportioned in this way: The cocking piece camming on the bolt gives one-quarter inch; the bolt camming on the receiver, one-eighth inch; and at the end of the forward stroke of the bolt, three sixty-fourths inch of straight compression of the mainspring, making the entire travel of the firing pin twenty-seven sixty-fourths of an inch. This shortening of the firing pin travel tends to make faster lock action and an easier working bolt.

The receiver extends to the rear of the bolt handle sufficiently to allow the cocking piece to slide in the same grooves as the locking lugs of the bolt, and be guided so that there can be absolutely no change in the vertical position of the cocking piece. This gives a constant amount of engagement between the sear and the cocking piece. Because of the cocking piece sliding in guides, the amount of engagement between the sear and the cocking piece can be greatly reduced as compared with the Springfield or Mauser, in both of which rifles the unguided cocking piece, with a large amount of tolerance in its fit, does not safely allow a small engagement of the sear. The engagement of the sear and cocking piece in my rifle is .015 of an inch.

The safety is in the receiver on the right-hand side, just back of the bolt handle, and is a small lever with a motion of ninety degrees, from vertical to horizontal. When it is in a vertical position, the gun is absolutely locked both as to the forward movement of the firing pin and the rotating of the bolt. The safety is held in position non-positively by a spring catch in the lever. The motion of taking off the safety is almost similar to cocking the old-fashioned hammer gun. This safety is nearly like the safety on the 30-S Remington, except that the action is opposite; that is, the safety is taken off by a downward movement of the thumb, and put on by a forward movement with the hand on the small of the stock and the finger on the trigger. This safety fulfills the three necessary conditions: it blocks the firing pin from advancing; it removes the cocking piece from contact with the sear, and it locks the bolt from turning.

CROSS SECTION OF MECHANISM OF RIFLE AND TELESCOPE



Key to numbers:

44, LENS CAGE FOR OBJECTIVE; 5, EJECTOR; 59, COIL SPRING; 52, WORM NUT FOR MOVING RETICULE VERTICALLY; 53, RETICULE; 48, WORM; 61, DIRT AND DAMP-PROOF SCREW CAP; 42, CAGE HOLDING INVERSION LENSES; 4, BOLT; 9, FIRING PIN SPRING; 10, LUG SLEEVE FOR HOLDING FIRING PIN AND SPRING IN BOLT; 12, COCKING PIECE; 11, SLEEVE NUT FOR HOLDING FIRING PIN IN COCKING PIECE; 1, TELESCOPE SIGHT TUBE AND RECEIVER, ALL IN ONE PIECE; 40, LENS CAGE WHICH HOLDS BOTH EYEPIECE AND INVERSION LENSES; 8, FIRING PIN; 24, SAFETY; 13, SEAR; 21, STOCK BOLT; 20, FERRULE ON FORWARD END OF BUTTSTOCK; 17, TRIGGER GUARD AND COVER PLATE; 14, TRIGGER; 15, MAGAZINE-CATCH RELEASE LEVER; 63, SEAR SPRING; 62, MAGAZINE CATCH SPRING; 16, MAGAZINE CATCH; 33, REAR GUIDE FOR DETACHABLE MAGAZINE; 37, REAR HEAD IN MAGAZINE FOR HOLDING REVOLVING CARTRIDGE FEED; 38, SPRING FOR FEEDING CARTRIDGES INTO POSITION; 36, CARTRIDGE RETAINER AND SWINGING GUIDE TO GUIDE CARTRIDGE INTO BARREL CHAMBER; 35, REVOLVING BARREL WITH ATTACHED ARM THAT FEEDS CARTRIDGE INTO LOADING POSITION; 32, ROD THROUGH MAGAZINE, WHICH IS DRIVEN FORWARD BY MAGAZINE CATCH AND HOLDS FRONT END OF MAGAZINE RIGIDLY IN PLACE; 31, MAGAZINE; 34, FORWARD GUIDE OF DETACHABLE MAGAZINE; 1, RECEIVER WHICH, WITH TELESCOPE TUBE, IS IN ONE PIECE.

The optical features of the telescope sight were worked out by Doctor Killmorgen of the Killmorgen Optical Company. As a result of the telescope tube and receiver being in one piece, it was necessary that the telescope be as short as possible, and this telescope is eight and one-quarter inches in length, which is unusually short. The eye-piece lenses are about one and three-eights of an inch in diameter. As the size of the field of view depends upon the size of the eye-piece lenses, I wished to make these as large as possible, and this was the largest diameter I could get with the telescope tube as low as I wanted to have it. The diameter of the field of view is thirty-five feet per hundred yards. The magnification is two and a half. The eye relief is three and a half inches. The exit pupil is 6.9 mm. The eye-piece lenses and the inversion lenses are contained in one lens cage, while the objective lenses are in another. I have a second set of objective lenses that can be used to increase the magnification to three and a quarter. This increases the length of the telescope about one-half of an inch. A small combination tool is carried in a pocket in the forearm, which is hand-detachable, and with this tool the full set of lenses can be changed; and also with it the reticule movement can be taken all apart. There is a duplicate set of lenses for the telescope held in regular cages and so adjusted that if anything happens to the lenses in the gun, a change can be made in a few minutes. This extra set of lenses, having been previously adjusted, do not necessitate re-zeroing in changing from one set to the other.

The vertical adjustment of the reticule is positive and is accomplished by revolving a worm nut on a threaded stem which is a part of the reticule. This worm is so made that one-half of the revolution moves the sight point a quarter of a minute of angle. The deflection adjustment is spring pressed on one side and actuated by a worm nut on the other, as in the elevation adjustment. This adjustment is also to quarter minute of angle. Because of the very small amount of motion required to move the reticule through a minute of angle or less, it was found that the ordinary screw thread was not accurate enough, and to achieve the

necessary degree of accuracy a stiff spiral spring was placed underneath the reticule to hold the screw threads permanently in contact on one side, and prevent all backlash. From actual trial this scheme appears to work perfectly, and insures almost absolute accuracy of movement of the reticule. The reticule movements are not intended for adjustment in the field, but only for zeroing, and the mechanism is covered by damp and dust proof screw caps which can be removed by means of the socket in the knob of the bolt handle; and when removed the worm nut can be rotated with the point of a knife or any other pointed instrument. When the protecting caps are screwed down, they absolutely lock all movement of the reticule.

The telescope sight on this rifle is the principal sight, and not an auxiliary sight as in the usual detachable telescope. With the present design, the telescope will probably be used all the time, and it would be most unusual for the iron sights to have to be used, which would occur only through some accident to the telescope lenses. Because of this contingency, however, I wished to provide for iron sights, and as the telescope is right above the bore of the rifle it was impossible to locate iron sights in the usual manner. To circumvent this, a small lug was provided on the rim at the rear end of the telescope tube at about eight o'-clock, and a three thirty-second inch peep hole was drilled through this lug. The front sight was mounted on an offset base to the left of the barrel. These offset sights are about seven-eights of an inch to the left of the center of the bore. As the open sights are not to be used except in emergency, or when the object fired at is less than thirty-five feet away, at which short distance the telescope sight would be out of focus, no adjustment of these sights is necessary, and they are permanently set for one hundred yards.

To provide proper support for the cheek with both the telescope sight and the iron sights, the stock had to be of special design, so I had Griffin and Howe make a trial stock with detachable cheek pieces of different thicknesses. One of these was so worked out with the right amount of flare at the bottom that I could slide my head down from aiming through the telescope sight

until my eye was opposite the peep sight, and have my cheek in absolute contact with the stock when using the open sight.

After the optics of the telescope had been worked out, the next thing was to get the telescope in the best position in relation to the eye when aiming. To do this, a set of lenses was put into a temporary telescope tube, and the tube fixed in adjustable clamps on a model of the gun, the model having the trial stock attached. The prone, sitting, kneeling, and offhand shooting positions were then tried, the telescope being slid back and forth in the mounts to determine the best compromise distance of the eye-piece from the eye.

This rifle is entirely hand demountable without the use of tools, with the exception of the telescope sight, and the removal of the barrel from the receiver. The butt stock, as mentioned, can be removed by using the bolt handle as a spanner to loosen the stock bolt nut in the butt plate. When the stock is removed, the cover plate which forms the trigger guard and guard for the magazine release, can be pulled to the rear and dropped off. After this cover plate is removed the pins for the sear, magazine catch, bolt stop, and magazine catch release, can be removed with the fingers. The spring catch on the safety can be pushed up and the safety lever placed at forty-five degrees forward of the vertical, when it can be pulled out. This also releases the latch for locking the bolt from opening. In dismounting the bolt and firing pin the lug sleeve in a pocket on the underside of the bolt handle can be pushed down and pried out with the point of a bullet or any similar instrument, which releases the firing pin and its spring from the bolt. The firing pin is in one piece and is held in the cocking piece by a sleeve nut, which is locked by a spring catch in the side of the cocking piece. By pushing this spring catch down with the point of a bullet, the sleeve nut is released and can be revolved by the fingers to release the firing pin from the cocking piece.

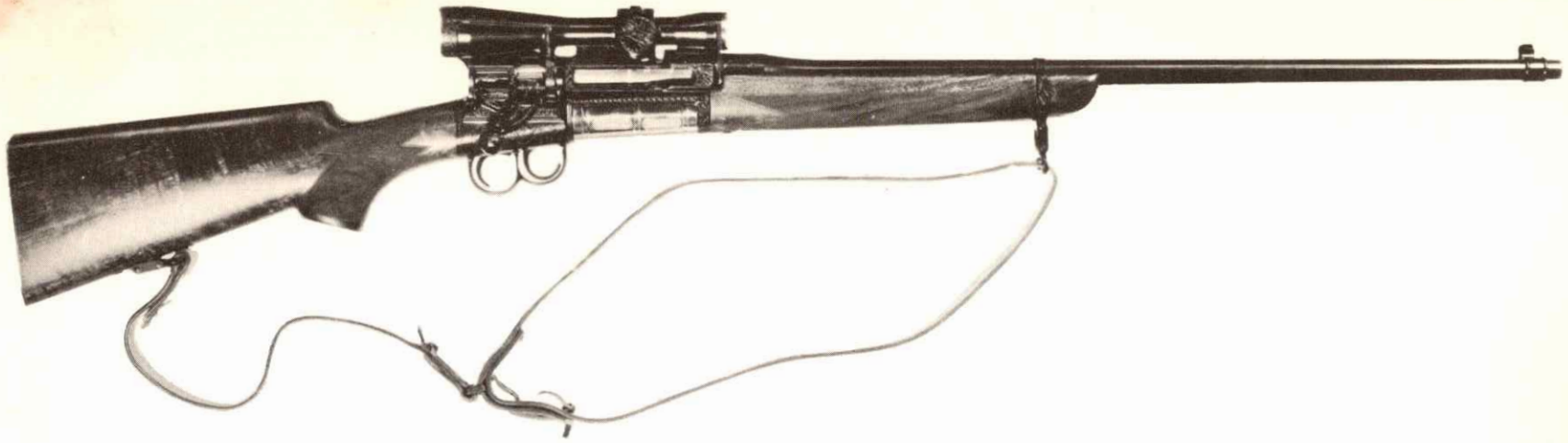
The extractor is of the same form as used in the Springfield and Mauser Rifles, and can be removed from the bolt in the usual manner.

The forearm is held on the barrel with an outside

band which is retained in place by two spring catches, something like the arrangement of the old musket band. These spring catches can be depressed and the band pulled off, the forearm then swung down and released from the receiver, it being held at the rear end by a hook which fits into a milled pocket in the forward end of the receiver.

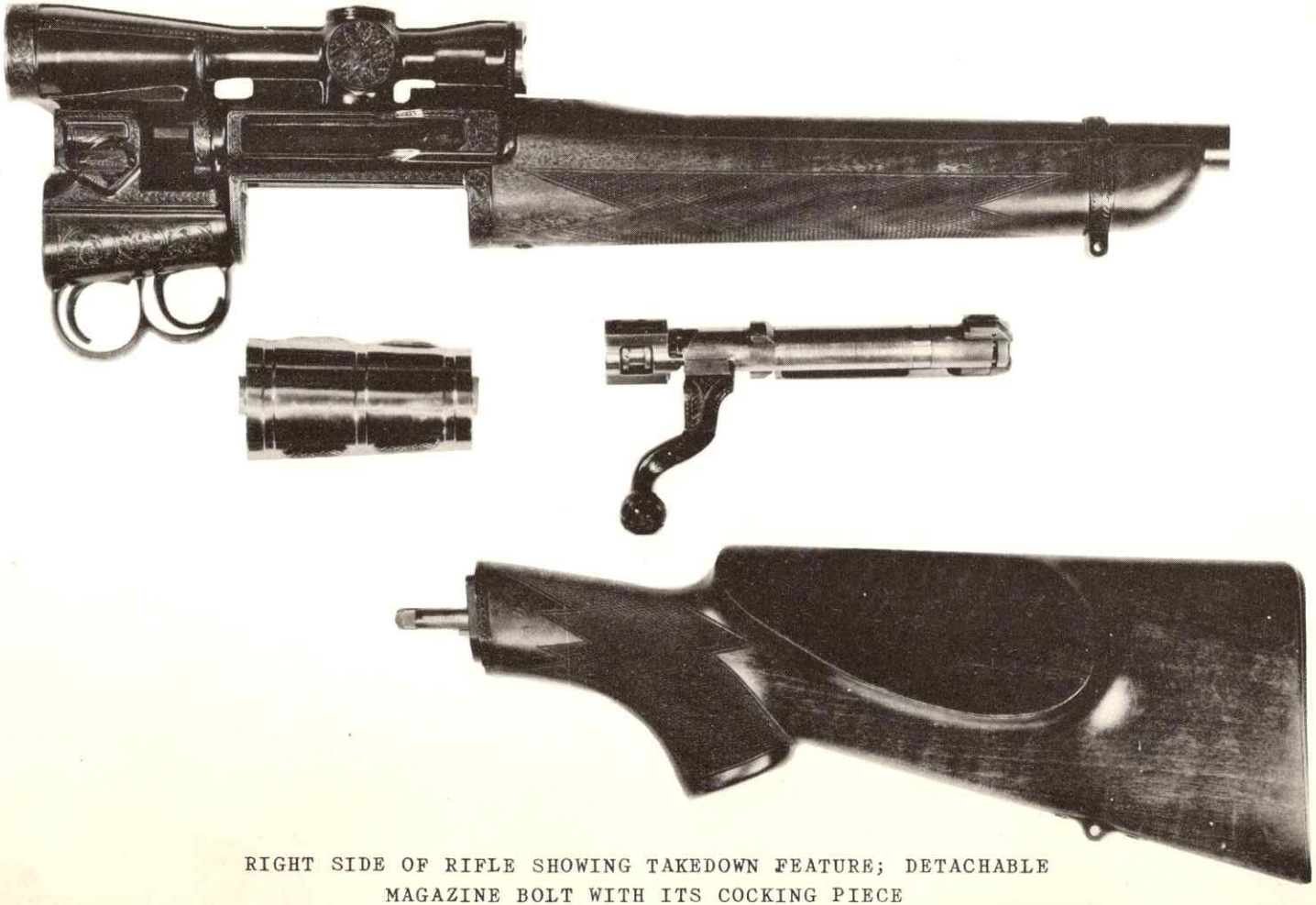
I have never hunted with this gun and have used it very little. The mechanism functions perfectly and the telescope and its adjustments seem to be very good.

After completing this gun, I made a couple of minor changes in the telescope sight. I found the adjustment of a quarter of a minute of angle unnecessarily small, so had the adjustment changed to one-half a minute of angle. The sighting post in the reticule of this rifle was originally exactly like the one described for the second telescope on the thumb-trigger rifle, with the exception that the width of the sighting post was reduced from ten to eight thousandths of an inch. I thought this width was even too wide, but this was as narrow as it was possible for me to make. I talked this over with Dr. Killmorgen and he suggested that they plate a glass disc with silver and then cut off all the silver plating, excepting a thin line in the center which would form the sighting post. This would reduce the width of the post to two or three thousandths of an inch. This was done and although I have not used it to any extent I think it makes an exceptionally good reticule. The insertion of this glass disc carrying the silver line of the sighting post, reduces the magnification about eight per cent, but I do not think this important.



RIGHT SIDE OF RIFLE

TOP OF RIFLE



RIGHT SIDE OF RIFLE SHOWING TAKEDOWN FEATURE; DETACHABLE MAGAZINE BOLT WITH ITS COCKING PIECE

CHAPTER VI

STRAIGHT-PULL RIFLES AND OTHER ARMS

I always had a desire to get up a practical straight-pull bolt action rifle, and in the summer of 1936 when I was in Europe, I bought and brought home with me the Swiss Military Rifle, which is the Rubin-Smidt; and also the model 1895 Austrian Rifle, both of these rifles being straight-pull. These two and the Ross Rifle are the only three straight-pull rifles ever designed. After studying these guns, I decided that the general principal of the Austrian was much the best of the three, especially for the Hornet Cartridge for which I wanted to use this gun.

I made a great many changes, in fact the only part of the rifle used was the receiver and this was considerably altered.

I used a design of safety very similar to the old one, but the bolt, bolt head, extractor, trigger motion, trigger and sear, and magazine were all re-designed and are much different from the original.

The action of the bolt mechanism is as follows: the bolt of the rifle is actuated by a straight backward and forward pull and push. The backward pull extracts the shell and the forward push loads and cocks the rifle. When the bolt is pulled to the rear, the

bolt cylinder cannot revolve owing to the ribs on its sides working in the grooves of the receiver. The bolt head, on the other hand, cannot come to the rear until the locking lugs have been disengaged from the recesses in the receiver ring, and this is effected by the turning motion given to the tail of the bolt head by the helical ribs in the inside of the bolt cylinder working in corresponding spiral grooves in the tail of the bolt head. The firing-pin spring is contained in the tail of the bolt head and is held in place by a screw cap that screws into the rear end of the bolt head. The firing pin passes through this screw cap. Primary extraction is given by the cam shape of the ends of the grooves in the receiver ring in which the locking lugs work. The first motion of the bolt to the rear is sufficient to disengage the locking lugs and partially compresses the main spring. As soon as the locking lugs are disengaged from the receiver, they are in prolongation of the ribs on the bolt cylinder and the whole bolt can then be drawn to the rear until brought in contact with the bolt stop.

The ejector is hinged in the receiver and is thrown upward by a flat spring into a slot in the bolt head three-sixteenths of an inch to the left of the center. The ejector being off center to the left with the grip of the extractor on the right-hand edge of the head of the cartridge, the latter is ejected sharply to the right and does not interfere with the tube of the telescope sight directly above it.

The magazine holds six cartridges and is hinged to the trigger-guard plate just forward of the trigger guard, and is held in place by a catch in its forward end fastening it to the trigger-guard plate. To load the magazine this catch is slid to the rear and the magazine swung down and out at right angles to the gun when it can then be loaded with six cartridges. This magazine is very similar to the one used on the Daly-Hornet Rifle, but differs in some details. The trigger motion is radically different than that on most guns. The trigger is not pivoted but slides straight upward into a cavity in the trigger-guard and stock when the forefinger of the hand is squeezed around it. This makes the trigger motion a straight squeeze by closing

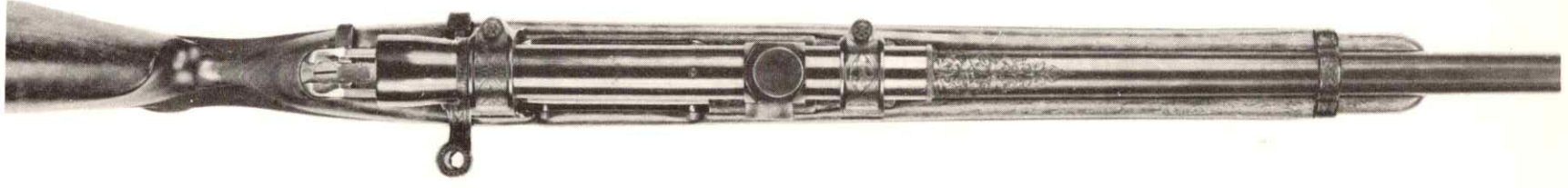
the hand with all the fingers close together with no extention forward of the trigger finger alone. I think this trigger motion may be an improvement on the old type of pivoted trigger, but do not as yet know, as I have not used the gun sufficiently to find out.

This rifle, of course, has a one-piece stock, the forearm of which is held to the barrel by a band which goes around both barrel and forearm and has an attachment to the forward end of the sling. This band is held in place by a plunger and a spiral spring that goes through the band locking it into place. The spiral spring on the other end of the plunger butts against the barrel. There is a space of about a sixteenth of an inch between the bottom of the band and the forearm which allows for the warping or shrinking of the stock without putting too much pressure on the barrel tending to spring it.

The telescope mount is of the bridge type, the rear mount being on the bridge of the receiver, and the forward mount on the barrel next to the receiver. The rear mount is fastened on by being dovetailed into the receiver with five screws. The forward mount on the barrel is a sleeve through which the barrel passes and is held in place by two set screws on the bottom side. A lock nut, which is threaded on to the barrel screws the mounting hard up against a shoulder on the barrel. To hold the telescope into the mounts, the mounts are split on the horizontal diameter, the top half being hinged on the right-hand side to the lower half. On the left-hand side on the top end of the mount, and also on the base of the mount, are two lugs through which passes a quarter inch bolt with a hexagon head. On screwing up this bolt the telescope is clamped very rigidly in the mounting, and this clamping also locks the focusing of the telescope. The cross handle for operating the bolt at its lower end is formed into a wrench and can be used to take out or tighten up the clamping bolt on the telescope mount. In this way the telescope sight can be taken out and another one, if of the same make and size, can be replaced in a few minutes; also, the telescope sight can be re-focused and put back very quickly without the use of any additional tools.

RIGHT SIDE OF RIFLE SHOWING MAGAZINE OPENED
IN LOADING POSITION AND BOLT

RIGHT SIDE OF RIFLE



TOP OF RIFLE

STRAIGHT PULL HORNET RIFLE, SHOWING
TELESCOPE MOUNT AND BOLT

FIG. 1.

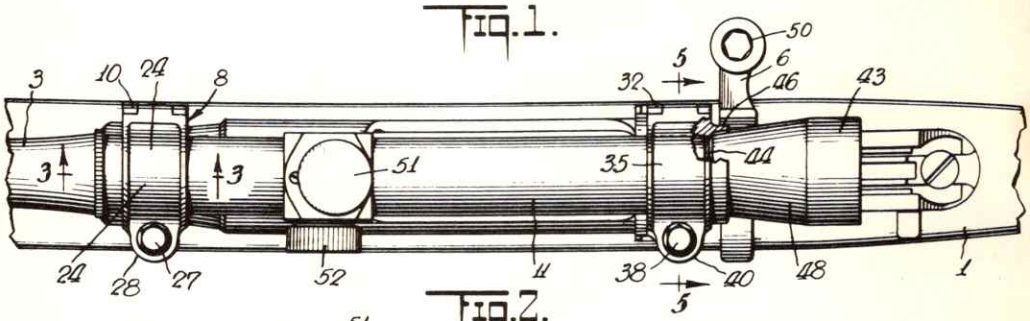


FIG. 2.

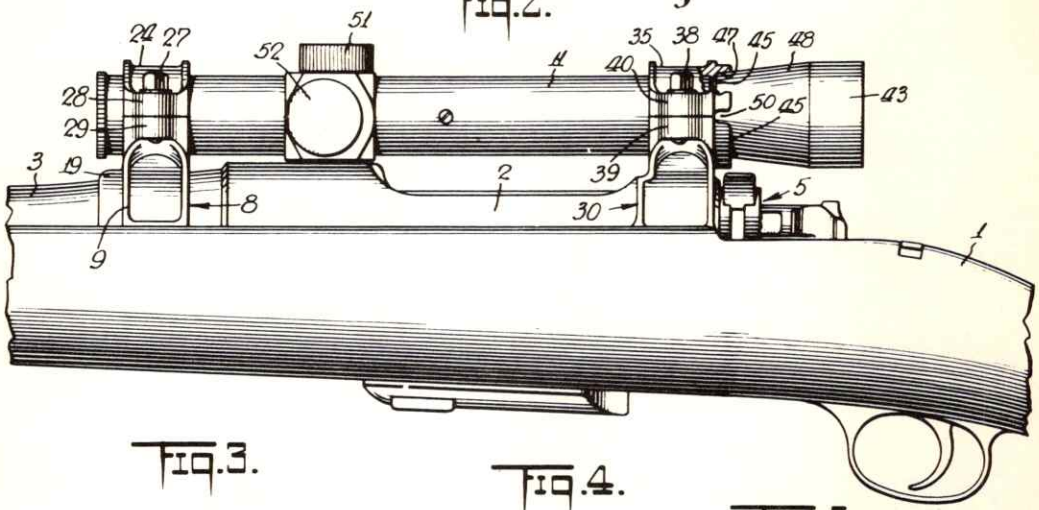


FIG. 3.

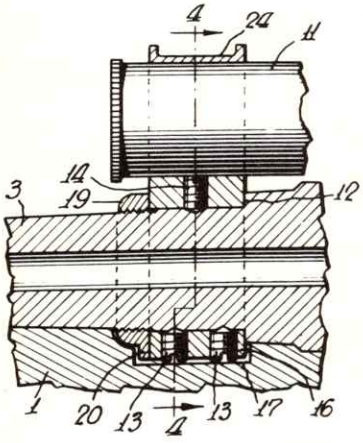


FIG. 4.

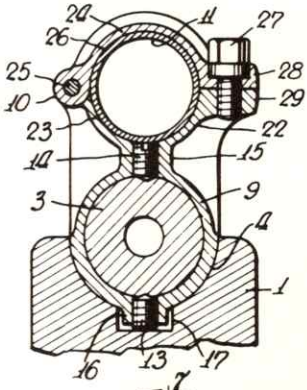


FIG. 5.

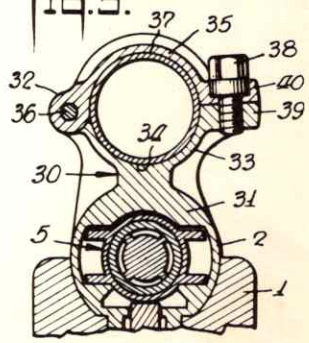


FIG. 6.

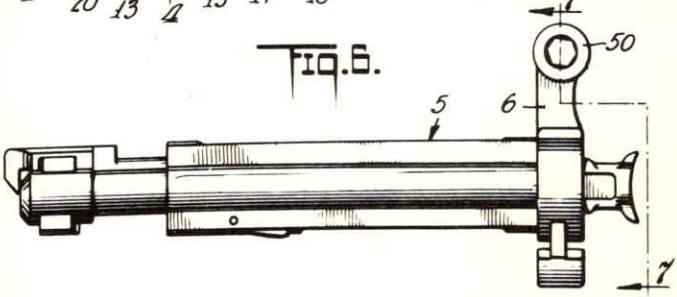
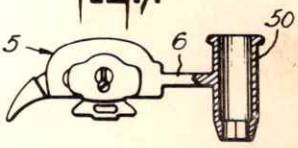


FIG. 7.



INVENTOR
Ralph C. Packard
BY
Glenn C. Klein
ATTORNEY

STRAIGHT PULL HORNET RIFLE, SHOWING
PARTICULARLY TRIGGER MOTION

Fig. 1.

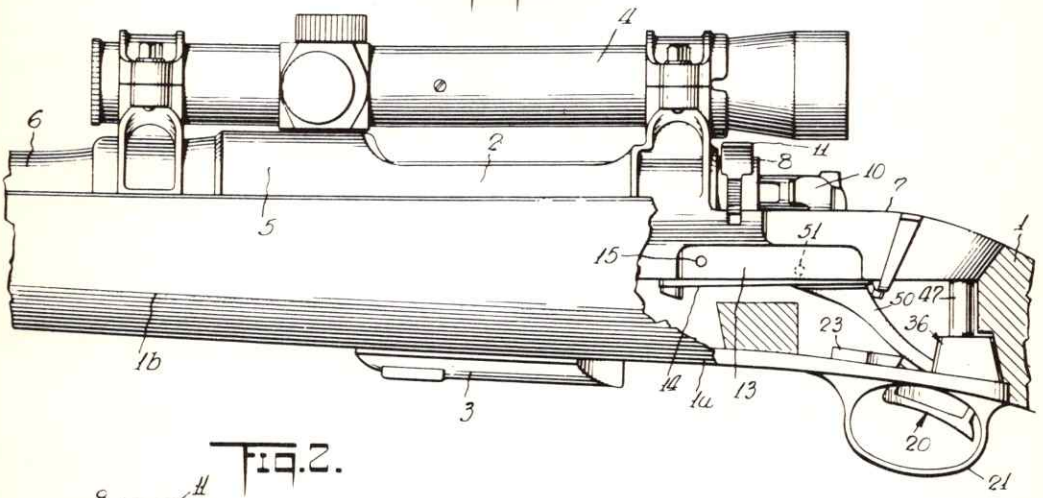


Fig. 2.

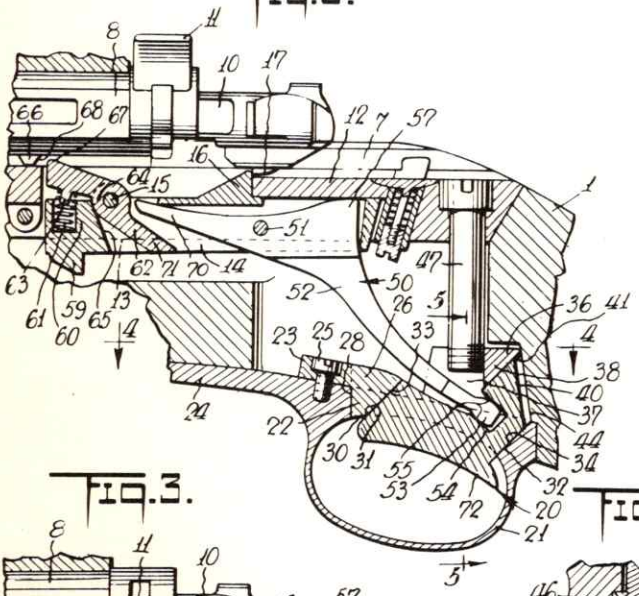


Fig. 4.

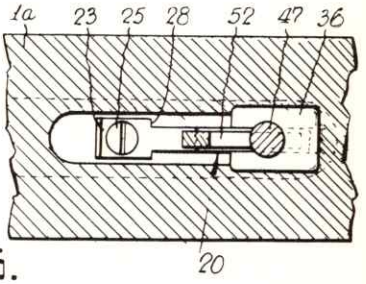


Fig. 3.

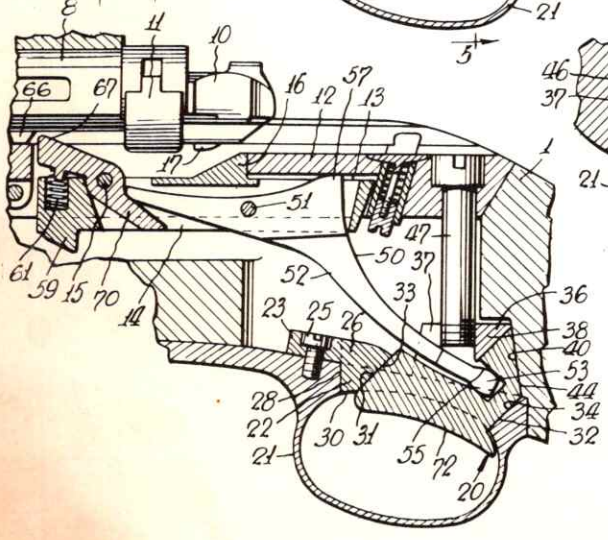


Fig. 5.

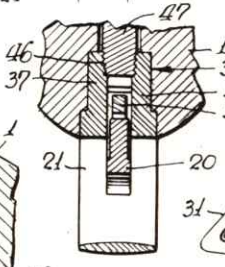
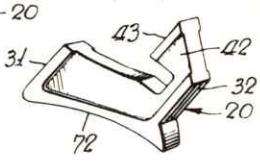


Fig. 6.



INVENTOR
Ralph G. Packard
BY
George C. O'Neal
ATTORNEY

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THE 22 CALIBER LONG RIFLE

This rifle has come into great popularity during the last twenty years. I have never cared for small bore rifles, although I have used the .22, usually taking one along to shoot small game when on my hunting trips. The first one I had was the Flobert, shooting the BB Cap, which had no power and was not much good. I had a single shot bolt-action Savage, which I used in New Brunswick for partridges. Later, I used the Winchester Trombone Action .22; also the Winchester .22 Automatic. This .22 Automatic had a special cartridge and I think was a good deal more powerful than the .22 Long Rifle in use at that time. I used this rifle for shooting partridges in New Brunswick, and also killed two deer with it. I have had several of the Remington Pedersen design trombone action .22, and liked them better than any other I had ever used. On one hunting trip I used the Remington Browning Design Automatic .22, and did not like it at all. I was never enthusiastic about the .22 Rifles and took no particular care of them, although, as a general rule, I always took one of this type rifle with me on my hunting trips as they were so useful in shooting birds and small game to eat, and I generally bought a new rifle for each trip.

On one of my hunting trips to Yukon Territory, I did not bring a .22 with me, so bought one from one of the trading posts. It was a single shot bolt-action, made by the Birmingham Small Arms Company. It was a poor gun and had a very defective bolt stop, so much so you were very liable to pull out the bolt when you prepared to reload. This rifle was used to kill partridges, and I also killed a very large mountain ram with it. The ram was the largest mountain sheep head that I'd ever gotten. I gave this rifle to an Indian, and when I saw him a couple years later, he showed me how he had made the rifle into a single shot pistol to use on his trap line,

THE PISTOL

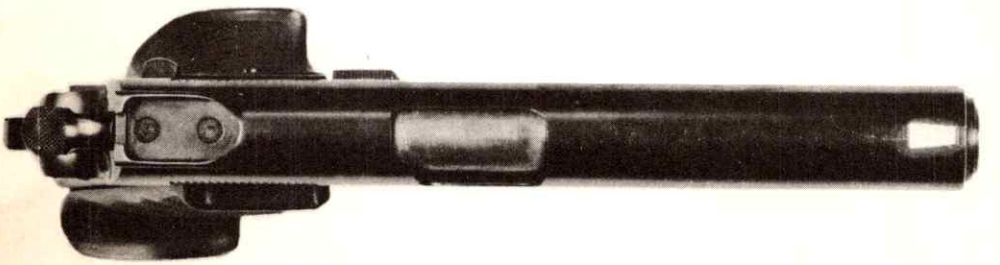
In the winters of 1916 and 1917, I had to remain in New York, and during this time I met Tom Anderton, the noted pistol shot, who was then armorer at the 107th Regiment Armory. I made an arrangement with him to be at the Armory two or three times a week during these two winters, and shoot the Colt 45 Automatic. I was not content with the sights on the pistol as issued, and got up some very coarse sights of the Partridge type, the front sight being about three-sixteenths of an inch wide, and the rear sight when the pistol is held out at arm's length in the usual way, shows an opening, or strip of light on either side of the front sight about three-thirty-seconds of an inch wide. I carried the rear sight back as far as possible, thus getting a little longer sight radius. I found I was unable to hold this rear sight on the gun by screws, so had the rear end of the slide milled down to a flat, the size of the base of the sight, leaving two studs integral with the slide which go through the rear sight and are rivetted on the base of the sight. Both Anderton and I believed these sights were good improvements for rapid fire and moving targets.

A couple of years ago, I tried to improve one of these pistols by making special grips which gave a rest to the thumb and bottom edge of the right hand. I tried this but could not see much improvement, and, of course, it required an expecially large holster to carry the pistol. On the whole, I think the thin-checked grips as issued on the Colt 45 Automatic are better. The sights and grips of the pistol are shown by the accompanying three photographs.

When I was in New Guinea, in 1908, I had with me a Colt Automatic, using the same cartridge that the Colt Company now call the 38 Super-Automatic. The trouble with this pistol was that the grip was not placed at a proper angle to the barrel, the grip being almost at right angles with the barrel, and not sloped to the rear as in the case of the final developments of the 45 Colt Automatic of the Army. I had special sights put on this pistol and after you got the hang of shooting with it, it seemed to work quite well, but you could not

LEFT SIDE OF PISTOL SHOWING SIGHTS AND SPECIAL GRIP

REAR END OF PISTOL LOOKING THROUGH THE SIGHTS



TOP VIEW OF PISTOL SHOWING SIGHTS AND SPECIAL GRIP

point naturally with it as accurately and surely as you can with the present 45 Colt Automatic.

I have owned and tried several of the high-powered revolvers, including the Smith & Wesson Outdoorsman 38-44; also the 357 high powered Smith & Wesson; and the Colt 38-44 Shooting Master. I have shot these three revolvers and did not like any of them as well as the Colt 45 Automatic. I found the 357 Smith & Wesson had too much recoil to shoot it comfortably for a number of shots, but as this revolver also took the 38-44 Smith & Wesson, it shot very comfortably with this cartridge, and was the most beautifully made revolver that I've ever seen.

I think the German Walther 380 Automatic is the best pocket pistol that has ever been produced. It has one peculiarity ahead of all other automatic pistols - it can be cocked and fired by pulling the trigger exactly like a double-action revolver. It has a rebounding hammer, consequently a safety is not necessary. I have reformed one of these pistols by making a new trigger guard, in which there is no guard in front of the trigger, and taking out the safety mechanism altogether. I think this makes the fastest and best pocket pistol for self defense there is.

I think it was in 1896 that I made a bicycle trip in Germany and Austria. My friend, David Gaines, who was with me in Morocco accompanied me also on this trip. I had a letter of introduction to a Mr. Borchardt, who was either General Manager or Superintendent of Ludwig-Loewe & Company, located in a suburb of Berlin, who at that time were the largest manufacturers of military rifles in Germany. They had made all the Mauser Rifles for the Spanish Government which were used in our Spanish-American War; also, they filled numerous large contracts for military rifles, Model 1888, for the Imperial German Government. Mr. Borchardt conducted us all over the factory, and also demonstrated the Borschott Pistol which he had invented. This Borschott Pistol is the forerunner of the Luger Pistol, and is almost similar excepting the spring in the original Borschott Pistol, which closes the breech mechanism and puts in the cartridge, is a flat coil spring like a clock spring, and is in a rearward extension of the receiver, while

the Luger is a round wire coil spring in the handle. I have owned both the Luger and Borchardt Pistols, but never liked either of them as well as the Model 1911, 45 Colt Automatic, as I found the trigger pull was not nearly as good.

After leaving Berlin, Gaines and I bicycled to Leipzig where the big fair was going on. The Mauser Company had a large exhibit there which included the then new automatic pistol, using the wooden holster, which can be used for a stock, turning the gun into more or less of an excuse for carbine. It was almost entirely hand demountable. I think this Mauser Automatic Pistol has been one of the best money makers that any of the arms companies have gotten out. I have seen them all over the world. When I was in China in 1932, everybody in uniform carried one. I knew a trapper who had one when I was hunting in Yukon Territory, and he loaned it to me to kill a moose with.

CHAPTER VII

METHODS OF WORK AND FABRICATION

The first thumb trigger rifle I made was a conversion from the 8 mm. Mauser which I had done in our own shop at Bayonne. The second conversion to the thumb trigger was another 8 mm. Mauser which I had done by a gunmaker named Fred Adolph, who had his place near Ithaca, N. Y. I gave Adolph a complete set of drawings of the work to be done, which he did not follow at all carefully. The result was that the finished gun was no good and I never used it.

As I wanted to continue this work on perfecting the rifle with the thumb trigger, I finally located a small shop very well equipped with the proper tools, which was a shop especially for developing new inventions, known as the Manufacturers' & Inventors' Electrical Company, at that time located on Gold Street in New York City. I paid the concern $1.50 per hour per man for the use of the tools, and had work done at this shop for eighteen years, off and on, making my various guns. All the time I was working with this concern, I had the foreman and another toolmaker assigned to me, and talking our association over with these two men in 1936, they told me they had worked continuously for me nine years of the eighteen I had been working off and on with their concern.

After making a number of conversions of the Springfield, and a 318 and a 425 Westley-Richards Rifle, I decided to make a wholly new rifle, including the action and all metal work, excepting the barrel. For this designing I usually made rough pencil sketches and sometimes detail pencil scale drawings. From these sketches, a rough model was worked out, and from this rough model the actual finished model was made, which was practically an exact duplicate of the action of the gun to be produced.

One of the hardest things I found in gun design was keeping the size and weight down to where they should be, and I always had to struggle in this between the first rough model and the actual finished model. I found the matter of tolerance in fit of the various parts was not as formidable as expected. On account of these guns being individual and handmade, I could always make one part fit the other. When the metal work of the guns was completed, I sent them to the Remington Arms Company at Ilion, N. Y., who put in the barrels, made the stock, did the engraving, heat treatment and coloring, all under the supervision of Mr. Aubrey L. Lowe, who has been for years a very close and valued friend of mine, and of great assistance to me in getting up these special guns.

When the Manufacturers' & Inventors' Electrical Co. failed in 1936, I decided to make the straight pull Hornet Rifle as described. I went to a gunmaker by the name of George Hyde, who has a shop in Brooklyn, and he employed two tool-makers for me. Together they built the rifle previously described.